

HP Data Center Environmental Edge Hardware Installation Guide

Abstract

This document is for the person who installs, administers, and troubleshoots HP Data Center Environmental Edge systems.



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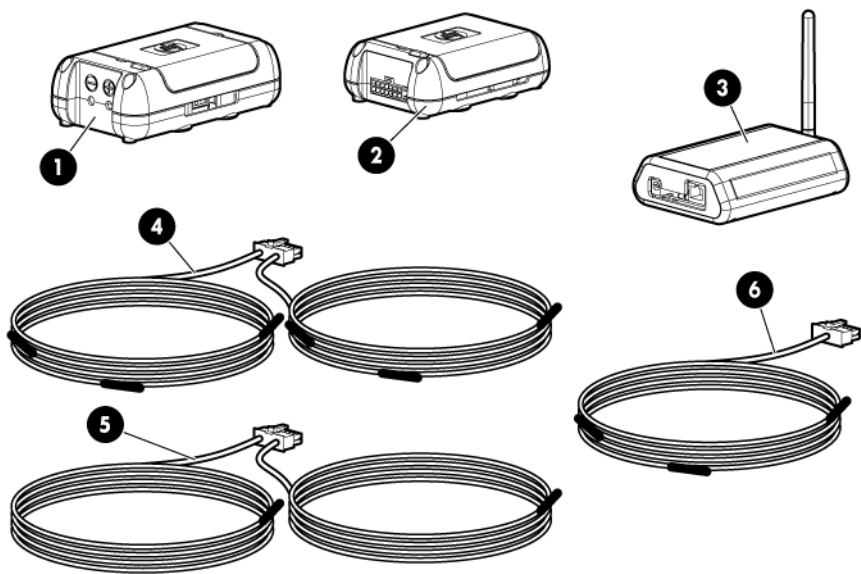
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HP Data Center Environmental Edge hardware overview

Recommended base configuration

HP recommends the following base configuration for your data center:

- Two Base Station Gateways for every 400 base stations (A minimum of one base station gateway is required per wireless network.)
- One Environmental Base Station and Plenum Rated Sensor Array for every CRAH/CRAC
- One Environmental Base Station and Rack Sensor Array or Three Point Sensor Array for every three racks
- One Air Pressure Base Station for every 50 m² (500 ft²) of data center floor space



Callout	Component
1	HP Air Pressure Base Station
2	HP Environmental Base Station
3	HP Base Station Gateway
4	HP Rack Sensor Array
5	HP Plenum Rated Sensor Array
6	HP Three Point Sensor Array

Consult your data center administrator for detailed placement and configuration information.

Required tools

The following items are required for installation:

- HP Environmental Edge Installer Kit
- Ladder
- Floor tile suction lifter
- Perforated floor tile lifter
- Battery-operated label maker with:
 - Spare batteries
 - Spare ribbon
- USB barcode scanner
- Small wire cutting pliers
- 18-30 AWG wire strippers
- No. 1 Phillips screwdriver
- 1/8-inch standard flathead screwdriver
- CAT5e Ethernet cable

HP Environmental Edge Installer Kit

The installer kit is provided to ease installation of the hardware components.

NOTE: Most installations do not use all items included in the Mounting Supplies Kit. Do not discard these items.

The following items are included in the HP Environmental Edge Installer Kit:

- 6-in zip ties (bag of 100)
- 7-in zip ties (bag of 100)
- Thermistor sensor mounting clips (100)
- Cable restraint clips
- Command strips (100)
- Double-sided tape
- Mounting tape liner
- Labels
- Alcohol wipes

For more information, see the *HP Data Center Environmental Edge Installation Kit Information* document.

HP Base Station Gateway

Overview: Gateway

The gateway collects information from all wireless base stations within a wireless network and sends the information to the HP Insight Environmental Observer software over an Ethernet connection.

Only one instance of the HP Insight Environmental Observer software can connect to a gateway device, though it can connect to multiple gateways within the data center, depending on the available network connection.

Configuring the HP Base Station Gateway

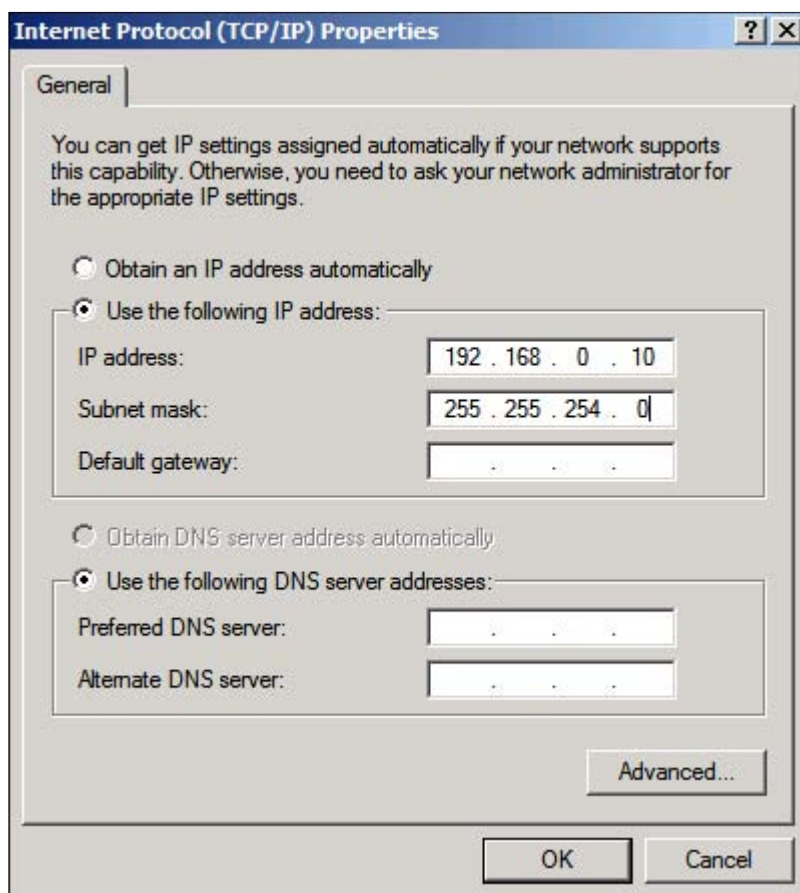
NOTE: The default IP address for each gateway is 192.168.0.2.

Each installed gateway must have a static IP address. Configure the gateway IP address, using the same address assigned to the gateway in the HP Insight Environmental Configurator, before you install the gateway and connect to the network. For more information, see the *HP Insight Environmental Configurator User Guide*. Consult your data center administrator to obtain gateway IP addresses.

To configure the gateway:

1. Connect one end of the supplied power cable to the gateway and the other end to a power source.
2. Connect one end of the CAT5 Ethernet cable to the gateway and the other end to the computer from which you will configure the gateway.

3. Configure the IP address of the computer to a temporary static address such as 192.168.0.10.



NOTE: You only need to set the IP address to a static address of the configuring computer during the configuration of the gateway. When you complete the configuration, restore your original network settings.

4. Open your web browser, and in the URL address box, type in the default gateway address:
`http://192.168.0.2`
The Lantronix Web Manager Login window appears.
5. Enter the case-sensitive user name and password.
 - The default user name is `admin`.

- The default password is PASS.



A Windows-style dialog box titled "Connect to 192.168.0.2". The title bar includes a question mark icon and a close button. The dialog has a blue header bar with a yellow key icon. Below the header, a message states: "The server 192.168.0.2 at config requires a username and password." There are two input fields: "User name:" with a dropdown menu showing "admin" and a small user icon, and "Password:" with a masked input field showing five dots. Below the password field is a checkbox labeled "Remember my password". At the bottom are "OK" and "Cancel" buttons.

Connect to 192.168.0.2

The server 192.168.0.2 at config requires a username and password.

User name: admin

Password:

☐ Remember my password

OK Cancel

6. In the navigation menu on left side of the page, select **Network**. The Network Configuration page appears.

LANTRONIX®

Status

Network Configuration

BOOTP Client: ☐ On ☐ Off

DHCP Client: ☐ On ☐ Off

IP Address:

Network Mask:

Gateway:

Hostname:

Domain:

DHCP Client ID:

Ethernet Link: Speed: ☒ Auto ☐ 10Mbps ☐ 100Mbps
 Duplex: ☒ Auto ☐ Half ☐ Full


Current Configuration

	Current	After Reboot
BOOTP Client:	Off	Off
DHCP Client:	Off	Off
IP Address:	10.100.100.31	10.100.100.31 [Delete]
Network Mask:	255.255.254.0	255.255.254.0 [Delete]
Gateway:	10.100.100.1 [Delete]	10.100.100.1
Hostname:	<None>	<None>
Domain:	<None>	<None>
DHCP Client ID:	<None>	<None>
Ethernet:	Auto 10/100 Mbps Auto Half/Full (100 Mbps Full)	Auto 10/100 Mbps Auto Auto Half/Full

NOTE: The Ethernet link settings of speed and duplex must match the settings of the switch and servers NIC. If the speeds or duplex do not match, then the gateway cannot communicate with the Edge server.

7. Populate the following fields, using the same information you entered in the HP Insight Environmental Configurator:
 - o IP address (Example: 10.100.100.30)
 - o Network mask (Example: 255.255.254.0)
 - o Gateway (Example: 10.100.100.1)
8. Select **Submit**.
9. Verify the default settings on the following pages:

- Device Status page



Status

Network

Line

Tunnel

CPM

DNS

PPP

SNMP

FTP

TFTP

Syslog

HTTP

RSS

CLI

Email

SSH

SSL

XML

Filesystem

Protocol Stack

IP Address Filter

Query Port

Diagnostics

System

Device Status

Product Information		
Product Type:	Remote Gateway 2	
Firmware Version:	3.2.0.1R7	
Build Date:	Jun 25 2007 (11:16:03)	
Serial Number:	07081717I5SA5G	
Uptime:	87 days 21:38:24	
Permanent Config:	Saved	
Network Settings		
Ethernet:	Auto 10/100 Mbps Auto Half/Full (100 Mbps Full)	
MAC Address:	00:20:4a:94:47:64	
Host:		
IP Address:	10.100.100.31 / 255.255.254.0	
Default Gateway:	10.100.100.1	
Domain:		
Primary DNS:		
Secondary DNS:		
Line Settings		
Line 1:	RS232, 115200, N, 8, 1, None	
Line 2:	RS232, 9600, N, 8, 1, None	
Line 3:	Down RS232, 9600, N, 8, 1, None	
Tunneling	Connect Mode	Accept Mode
Tunnel 1:	Disabled	Active
Tunnel 2:	Disabled	Waiting

- Line 1 Configuration page

Status
Network
Line
Tunnel
CPM
DNS
PPP
SNMP
FTP
TFTP
Syslog
HTTP
RSS
CLI
Email
SSH
SSL
XML
Filesystem
Protocol Stack
IP Address Filter
Query Port
Diagnostics
System

Line 1
Line 2
Line 3

Statistics
Configuration
Command Mode

Line 1 - Configuration

	Current Setting	Change Setting To
Name:		<input type="text"/>
Status:	Enabled	Enabled ▾
Protocol:	Tunnel	Tunnel ▾
Baud Rate:	115200	115200 ▾ Custom <input type="text"/>
Parity:	None	None ▾
Data Bits:	8	8 ▾
Stop Bits:	1	1 ▾
Flow Control:	None	None ▾
Xon char:	0x11 (\17)	<input type="text"/>
Xoff char:	0x13 (\19)	<input type="text"/>
		Submit

- Tunnel 1 Serial Settings page

Status

Network

Line

Tunnel

CPM

DNS

PPP

SNMP

FTP

TFTP

Syslog

HTTP

RSS

CLI

Email

SSH

SSL

XML

Filesystem

Protocol Stack

IP Address Filter

Query Port

Diagnostics

System

Tunnel 1

Tunnel 2

Statistics

Serial Settings

Start/Stop Chars

Accept Mode

Connect Mode

Disconnect Mode

Packing Mode

Modem Emulation

AES Keys

Tunnel 1 - Serial Settings

Buffer Size:
 Read Timeout: milliseconds
 Wait For Read Timeout: ☐ Enabled ☐ Disabled

Current Configuration

Line Settings:	RS232, 115200, N, 8, 1, None
Protocol:	Tunnel
Buffer Size:	2048 bytes Reset
Read Timeout:	200 milliseconds
Wait For Read Timeout:	Disabled

- Tunnel 1 Accept Mode page

Status
Network
Line
Tunnel
CPM
DNS
PPP
SNMP
FTP
TFTP
Syslog
HTTP
RSS
CLI
Email
SSH
SSL
XML
Filesystem
Protocol Stack
IP Address Filter
Query Port
Diagnostics
System

Tunnel 1
Tunnel 2

Statistics
Serial Settings
Start/Stop Chars
Accept Mode
Connect Mode
Disconnect Mode
Packing Mode
Modem Emulation
AES Keys

Tunnel 1 - Accept Mode

Mode:
☐ Disabled
☒ Enabled

☐ Any Character
☐ Modem Control Asserted

☐ Start Character
☐ Modem Emulation

Local Port:

Protocol: ☐ TCP ☐ SSH ☐ Telnet ☐ TCP/AES

Flush Serial Data: ☐ Enabled ☐ Disabled

Block Serial Data: ☐ On ☐ Off

Block Network Data: ☐ On ☐ Off

TCP Keep Alive: seconds

Email on Connect:

Email on Disconnect:

CP Set Group:

On Connection:

On Disconnection:

Password:

Prompt for Password: ☐ On ☐ Off

Current Configuration

Mode:	Enabled (Active)
Local Port:	10001
Protocol:	Tcp
Flush Serial Data:	On Connection
Block Serial Data:	Off
Block Network Data:	Off
TCP Keep Alives:	Default 45 seconds
Email on Connect:	<None>
Email on Disconnect:	<None>

- Tunnel 1 Connect Mode page

Line
Tunnel
CPM
DNS
PPP
SNMP
FTP
TFTP
Syslog
HTTP
RSS
CLI
Email
SSH
SSL
XML
Filesystem
Protocol Stack
IP Address Filter
Query Port
Diagnostics
System

Statistics
Accept Mode
Packing Mode

Serial Settings
Connect Mode
Modem Emulation

Start/Stop Chars
Disconnect Mode
AES Keys

Tunnel 1 - Connect Mode

Mode:
☐ Disabled
☐ Enabled
☐ Any Character
☐ Modem Control Asserted
☐ Start Character
☐ Modem Emulation

Remote Address:
Remote Port:
Local Port:

Protocol:
☐ TCP
☐ UDP
☐ SSH
☐ TCP/AES
☐ UDP/AES

Reconnect Timer: milliseconds
Flush Serial Data:
☐ Enabled
☐ Disabled

SSH Username:
Block Serial Data:
☐ On
☐ Off
Block Network Data:
☐ On
☐ Off

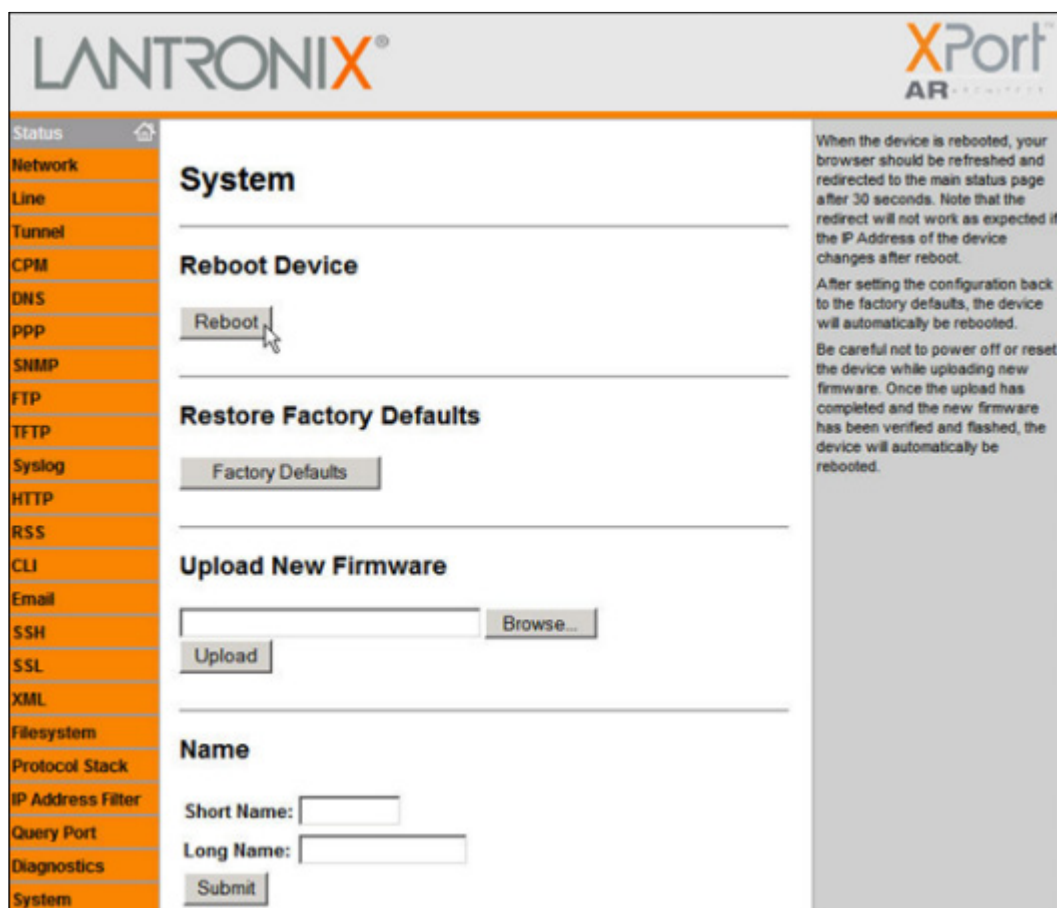
TCP Keep Alive: seconds
Email on Connect:
Email on Disconnect:

CP Set Group:
On Connection:
On Disconnection:

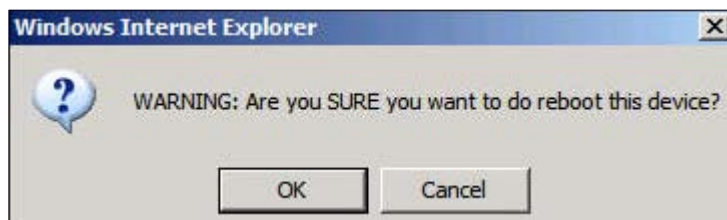
Current Configuration

Mode:	Disabled
Remote Address:	<None>
Remote Port:	<None>
Local Port:	Random
Protocol:	Tcp
Reconnect Timer:	15000 milliseconds
Flush Serial Data:	Disabled
SSH Username:	<None>
Block Serial Data:	Off
Block Network Data:	Off
TCP Keep Alives:	Default 45 seconds
Email on Connect:	<None>
Email on Disconnect:	<None>

10. In the navigation menu on the left side of the page, select **System**. The System page appears.



11. Select **Reboot**. The confirmation window appears.



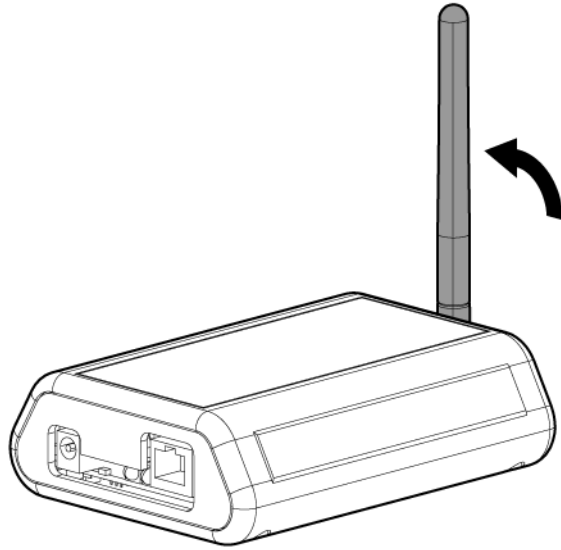
12. Select **OK**. The gateway reboots, and the new configured parameters take effect.
13. Repeat steps 1 through 11 for all gateways, using each unique IP address used in the HP Insight Environmental Configurator.
14. Restore the original network settings on your computer.

Installing the HP Base Station Gateway

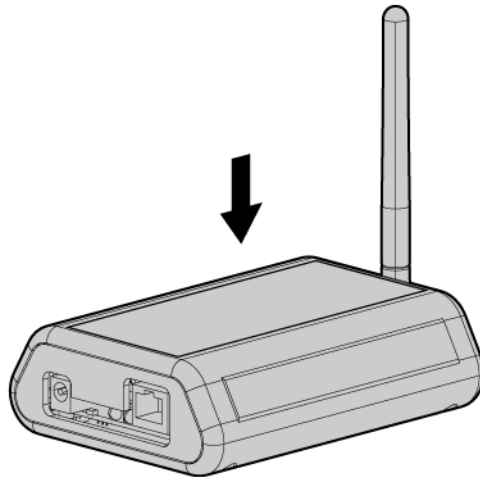
NOTE: Consult your data center administrator to determine the location for the gateway that optimizes the wireless range for all base stations.

1. Determine the location for the gateway in your data center.
2. Ensure the location is free from dust before installing the gateway.

3. Insert and tighten the antenna to the gateway.

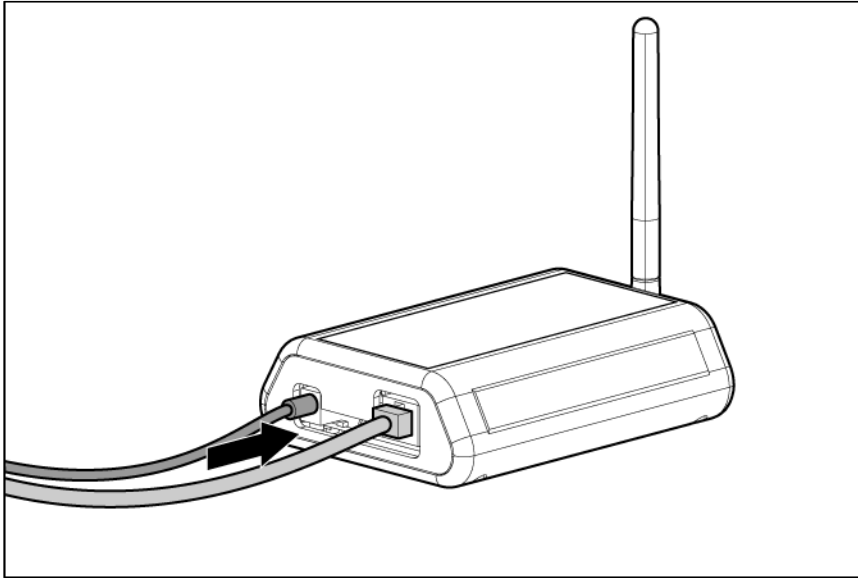


4. Remove the mounting tape liner, and secure the gateway to the desired location.

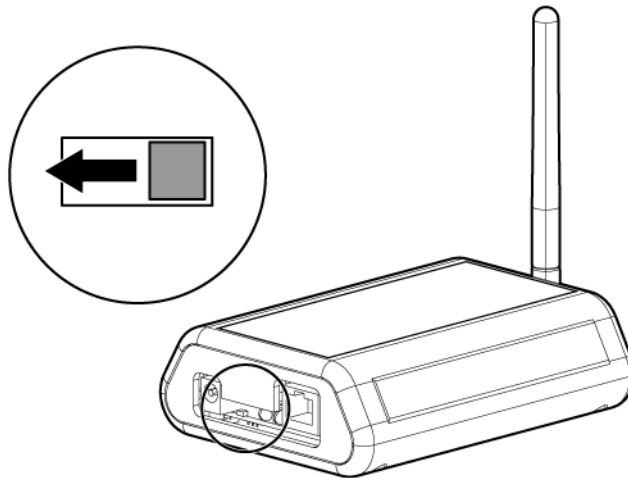


5. Connect one end of the supplied power cable to the gateway and the other end to a power source.

6. Connect one end of the CAT5 Ethernet cable to the gateway and the other end to your network.



7. Turn on the gateway by flipping the power switch.



8. Verify that the gateway is connected to power and is working in operation mode by viewing the gateway LED status (on page 18).
 - Connected—The gateway Active LED is either flashing or solid green and the Battery LED is off.
 - Not connected—The gateway Battery LED is either flashing or solid red.

Installation is complete.

Gateway LED status

The HP Base Station Gateway has the following LEDs:

- Battery LED
 - Flashes red if the gateway is not connected to power and is running on batteries.

- Is solid red if the gateway is not connected to the network or if HP Insight Environmental Observer application is not running.
- Active LED
 - Flashes green if the gateway is communicating and active.
 - Is solid green if the gateway is connected properly and is working in operating mode.

HP Environmental Base Station installed on a rack

Overview: Installing a base station on a rack

The base station is a wireless device that collects temperature data from the external sensor arrays and sends the information to the gateway. The base station has its own internal temperature and humidity sensors and collects data to send to the gateway.

When the base station is installed on a rack, it is attached to either the HP Rack Sensor Array or the HP Three Point Sensor Array. The base station sends its internal temperature and humidity readings and the external temperature readings from the sensor arrays to the gateway.

Each sensor array is composed of sensor pods. Each pod has a thermistor that collects temperature data for a specific location. The sensor array is connected to the HP Environmental Base Station, which collects all thermistor readings and sends the readings to the gateway.

Two types of sensor arrays can be installed on the rack:

- **HP Rack Sensor Array**—The array is composed of six sensor pods. The array is designed for installation on a rack. Three thermistors are on the front rack door of a cold aisle, and three thermistors are on the rear rack door of a hot aisle.
- **HP Three Point Sensor Array**—The array is composed of three sensor pods. The array is designed for installation on the front rack door of a cold aisle, hanging from a wall, or installed at the end of a rack row.

You can install the sensor arrays on the inside of perforated rack doors or the outside of any rack doors. HP recommends installing the sensor arrays on the inside of the rack doors, if possible.

NOTE: If your rack does not have a door, HP recommends installing the sensor array on the front left rail of the rack.

NOTE: If you have hot air recirculation issues, then install an HP Three Point Sensor Array at the end of your rack row to help identify the problem location.

Installing the HP Environmental Base Station on a rack

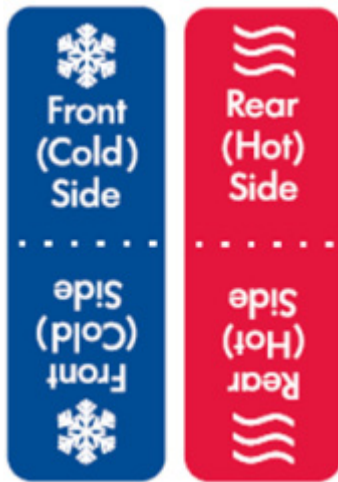
Installing the HP Rack Sensor Array or HP Three Point Sensor Array

1. Ensure the rack doors are free from dust before installing the sensor array.

NOTE: The sensor array has labels that indicate the location where the array string must be installed. Before installation, verify that you are installing the array string to the correct location.

2. Verify that you are installing the correct sensor string to the correct side of the rack.

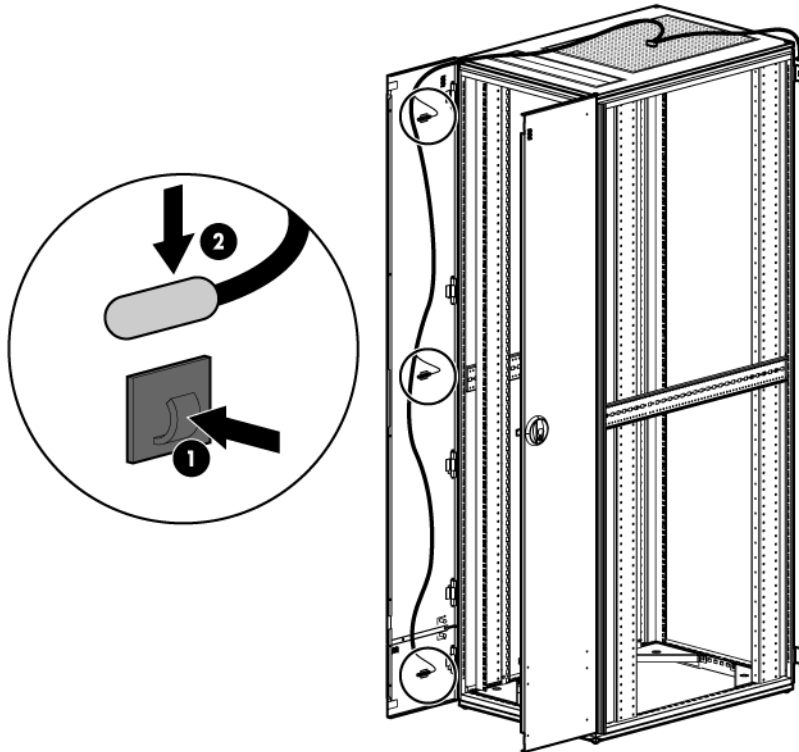
- The HP Rack Sensor Array has the Front (Cold) Side label and the Rear (Hot) Side label, indicating where the sensor string is installed.



- The HP Three Point Sensor Array does not have a label and can be installed anywhere on the rack or in the data center.

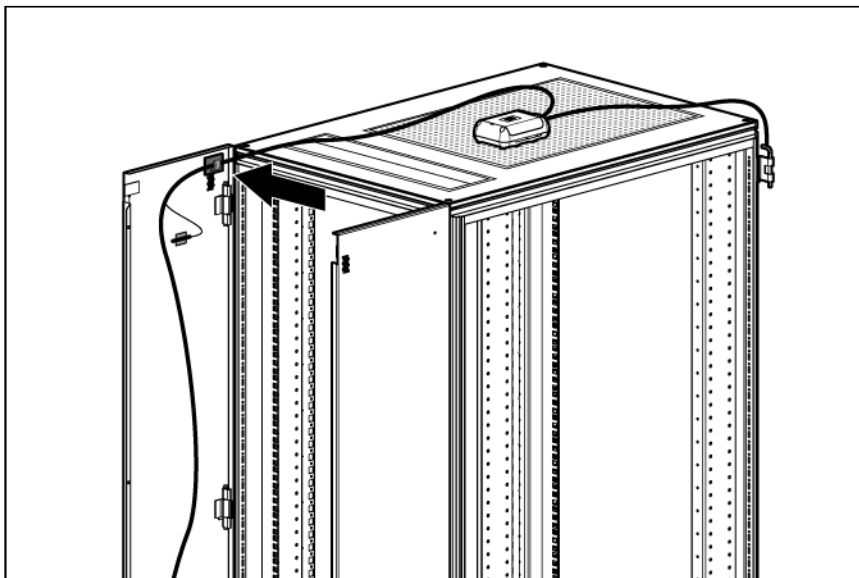
NOTE: The preconfigured lengths between the sensor pods are designed to fit a standard 42U rack and should be evenly spaced: one at the top of the rack door, one in the middle of the rack door, and one at the bottom of the rack door. If you are installing the sensor pods on a rack of a different size and require an extension, consult your data center administrator.

3. Remove the mounting tape liner and attach the top pod bracket to the designated location. Repeat this step for the remaining two pod brackets.
4. If the sensor pod is not connected to the pod bracket, slide the top sensor pod into the pod bracket installed at the top of the rack door (3). Repeat this step for the remaining two pods.



5. Remove the mounting tape liner and attach the cable restraint brackets near the door hinges on the rack.

NOTE: The disconnect connector on the sensor array enables you to remove the rack door for maintenance without having to uninstall the HP Environmental Base Station.

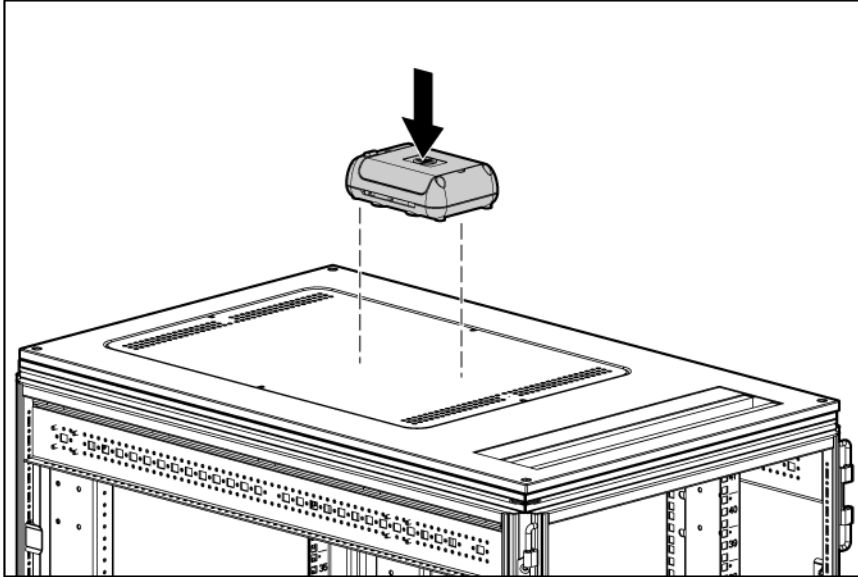


6. Using a cable tie wrap, secure any excess cabling.
7. If you are installing the HP Rack Sensor Array, repeat the previous steps for the rear door.

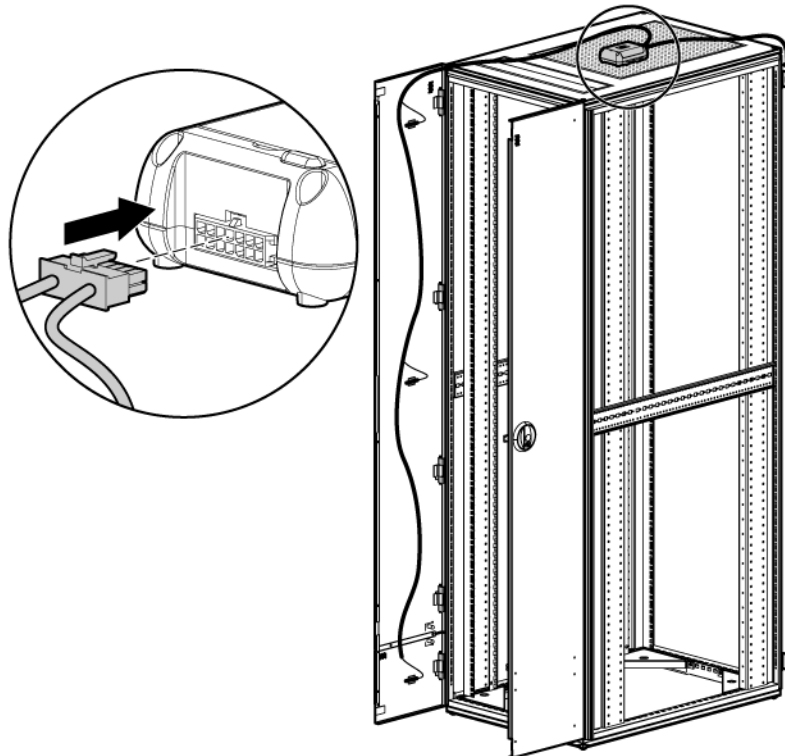
Installing the HP Environmental Base Station

NOTE: You can install the base station outside or inside of the top of the rack.

1. Ensure the area on the top of the rack is free from dust before installing the base station.
2. Remove the mounting tape liner, and secure the base station to the desired location on the top of the rack.



3. Connect the data transfer cable from the HP Rack Sensor Array or HP Three Point Sensor Array to the base station.



4. After all hardware is installed, power up the components ("Power up procedure" on page 70).

Installation is complete.

HP Environmental Base Station installed on a CRAH/CRAC

Overview: Installing a base station on a CRAH/CRAC

The base station is a wireless device that collects temperature data from the external sensor arrays and sends the information to the gateway. The base station also has its own internal temperature and humidity sensors and collects data of its own to send to the gateway.

When the base station is installed on a CRAH/CRAC, it is attached to the HP Plenum Rated Sensor Array, and sends its own internal temperature readings and the external temperature reading from the sensor arrays to the gateway.

The sensor array is composed of sensor pods, each with a thermistor that collects temperature data for a specific location. The sensor array is connected to the HP Environmental Base Station, which collects the thermistor readings and sends the readings to the gateway.

The HP Plenum Rated Sensor Array is composed of two sensor pods, one that measures the temperature at the supply side of the CRAH/CRAC, and one that measures the temperature at the return side of the CRAH/CRAC.

There are two CRAH/CRAC installation configuration options:

- Single—(Standard installation configuration) The base station measures temperature and humidity on the supply side of the CRAH/CRAC and measures only temperature on the return side of the CRAH/CRAC.
- Dual—(Optional installation configuration) The base station measures temperature and humidity on both the supply and return side of the CRAH/CRAC. The return air temperature is an average of six thermistor readings.

Installing the HP Environmental CRAH/CRAC (Single) Base Station



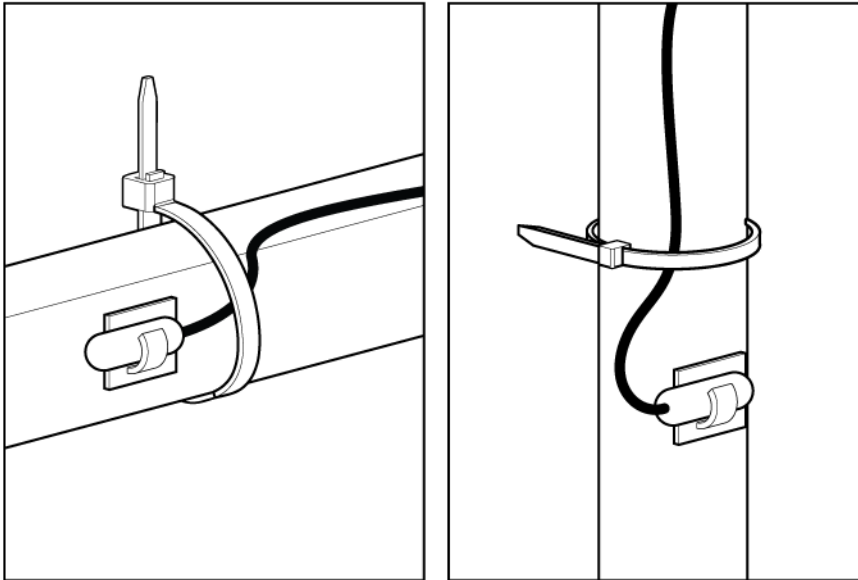
WARNING: The CRAH/CRAC must be powered down and the fans must be stopped before you access the return plenum for hardware installation.

Installing the HP Plenum Rated Sensor Array

1. Ensure the desired installation locations around the CRAH/CRAC are free of dust before installing the sensor array.

NOTE: The sensor array has labels that indicate the location where the array string must be installed. Before installation, verify that you are installing the array string to the correct location.

2. Verify that you are installing the correct sensor string to the correct location in the CRAH/CRAC. The CRAH Supply side is routed to the supply side of the CRAH/CRAC, and the CRAH Return side is routed to the return side of the CRAH/CRAC.
3. Route and install the supply sensor. HP recommends installing the supply sensor to a support beam under the sub-floor in front of the CRAH/CRAC. Consult your data center administrator for the exact location for installation.
 - a. Remove the mounting tape liner and secure the supply sensor bracket to the designated location in the supply air stream of the CRAH/CRAC.
 - b. Using a cable tie, secure the sensor bracket and any remaining cable.

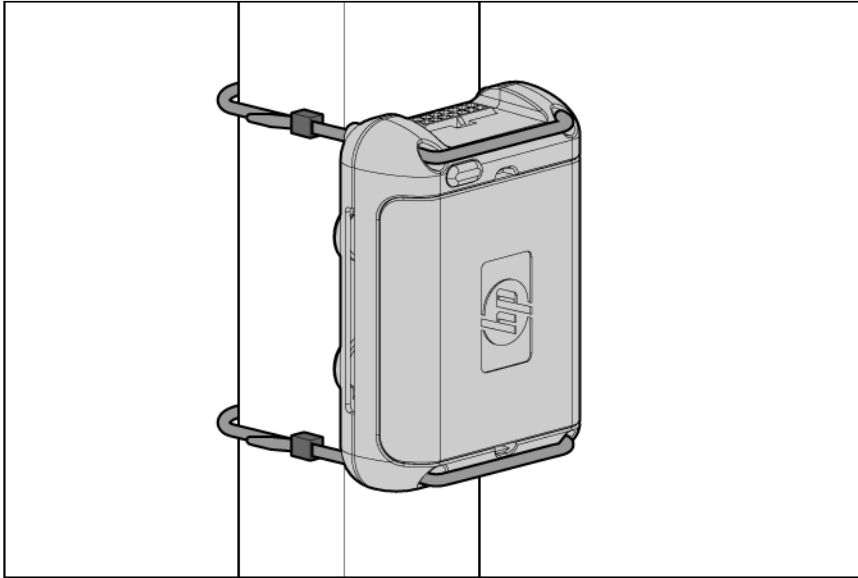


4. Route and install the return sensor. HP recommends installing the return sensor to a flat surface inside of the CRAH/CRAC. Consult your data center administrator for the exact location for installation.
 - a. Remove the mounting tape liner and secure the return sensor bracket to the designated location in the return air stream of the CRAH/CRAC.
 - b. Using a cable tie, secure the sensor bracket and any remaining cable.

Installing the HP Environmental Base Station

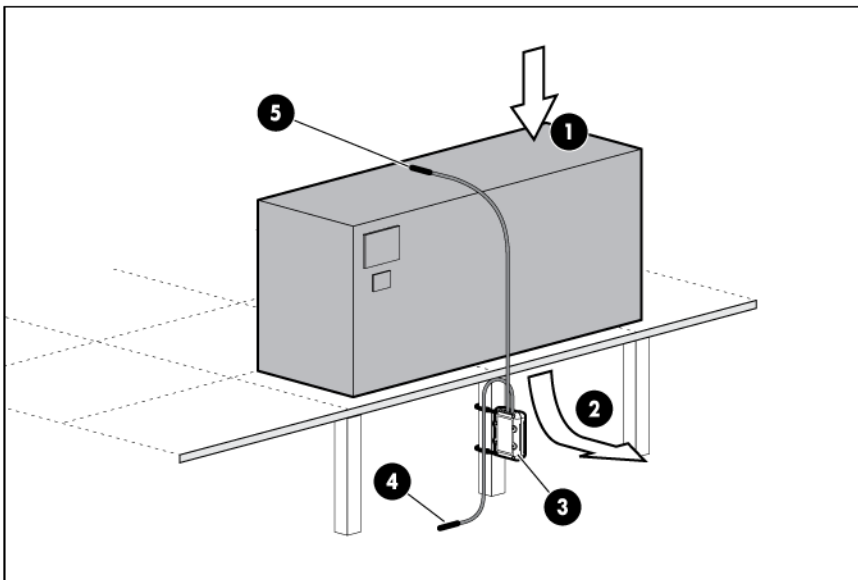
1. Install the base station in an unobstructed location under the floor plenum in front of the CRAH/CRAC supply air stream, to ensure accurate supply air humidity readings.

HP recommends using cable tie wraps to secure the base station to an available support bracket.



2. Connect the data transfer cable from the HP Plenum Rated Sensor Array to the base station.
 3. After all hardware is installed, power up the components ("[Power up procedure](#)" on page 70).
- Installation is complete.

Single CRAH installation diagram



Callout	Component	Description
1	CRAH return air stream	The return air side of the CRAH
2	CRAH supply air stream	The supply air side of the CRAH
3	Base station	The base station is mounted on the supply air side of the CRAH.
4	Supply side of plenum array	The three-point plenum array that measures the supply air temperature and humidity.
5	Return side of plenum array	The three-point plenum array that measures the return air temperature

Callout	Component	Description
		and humidity.

Installing the HP Environmental CRAH/CRAC (Dual) Base Station

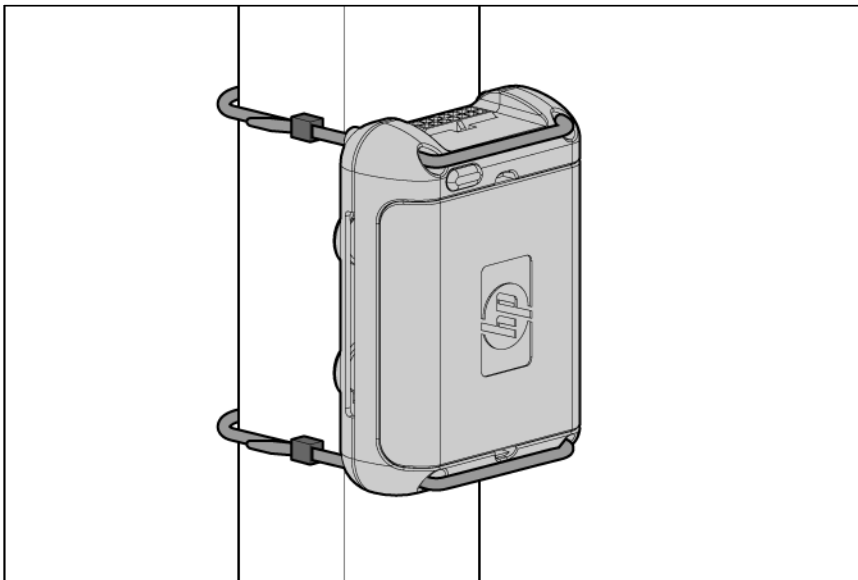
The CRAH/CRAC (Dual) Base Station consists of:

- One base station for the supply air—Measures the supply air temperature and humidity
- One base station for the return air—Measures the return air temperature (the average of the six sensors on the array) and humidity

Installing the HP Environmental Base Station in the supply air stream

1. Install the base station in an unobstructed location under the floor plenum in front of the CRAH/CRAC supply air stream, to ensure accurate supply air humidity readings.

HP recommends using cable tie wraps to secure the base station to an available support bracket.



NOTE: Do not attach a sensor array to the base station in the supply air stream. The sensors that measure the temperature and humidity are located inside the base station.

Installing the HP Environmental Base Station in the return air stream



WARNING: The CRAH/CRAC must be powered down and the fans must be stopped before you access the return plenum for hardware installation.

1. Using the cable tie wraps, secure the base station to an unobstructed location or support beam in the CRAH/CRAC return air stream.
2. Connect the data transfer cable from the HP Plenum Rated Sensor Array to the base station.

Installing the HP Plenum Rated Sensor Array in the CRAH/CRAC return air plenum

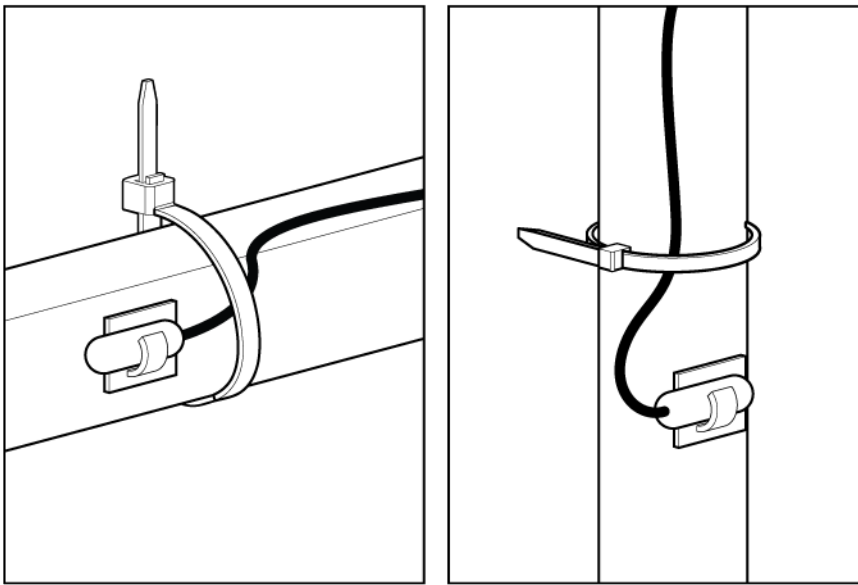


WARNING: The CRAH/CRAC must be powered down and the fans must be stopped before you access the return plenum for hardware installation.

1. Ensure the desired installation locations around the CRAH/CRAC are free of dust before installing the sensor array.

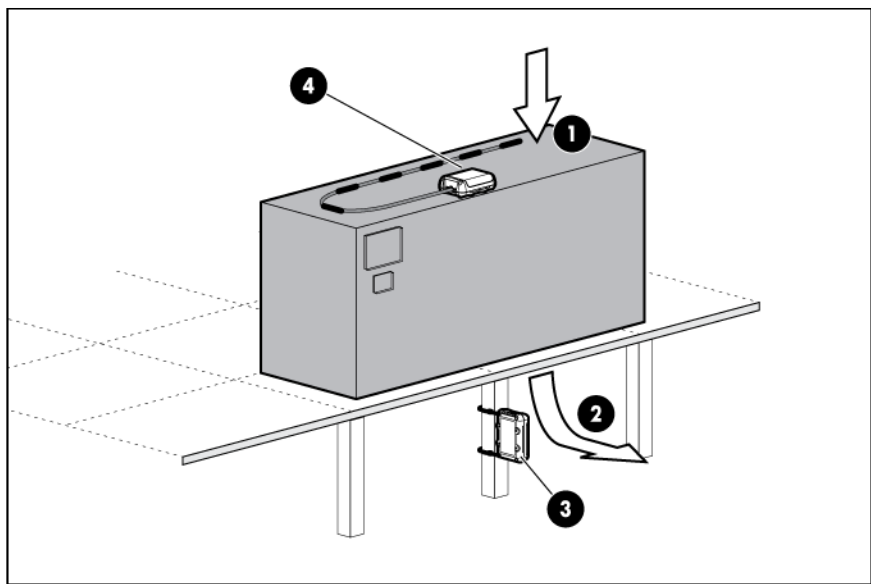
NOTE: During installation of a CRAH/CRAC (dual) base station, ignore the Supply and Return labels on the sensor array. All six sensors are installed in the return air stream.

2. Route and install the six sensors to a flat surface inside of the CRAH/CRAC, verifying that the air stream is not obstructed. Consult your data center administrator for the exact location for installation.
 - a. Remove the mounting tape liner and secure the return sensor bracket to the designated location in the return air stream of the CRAH/CRAC.
 - b. Using a cable tie, secure the sensor bracket and any remaining cable.



After all hardware is installed, power up the components ("[Power up procedure](#)" on page 70).
Installation is complete.

Dual CRAH installation diagram



Callout	Component	Description
1	CRAH return air stream	The return air side of the CRAH
2	CRAH supply air stream	The supply air side of the CRAH
3	CRAH supply base station	The base station is mounted on the supply air side of the CRAH, and measures the supply air temperature and humidity.
4	CRAH return base station and plenum array	The base station is mounted on the return air side of the CRAH, and attaches to the six-point plenum array that measures the return air temperature and humidity.

HP Air Pressure Base Station

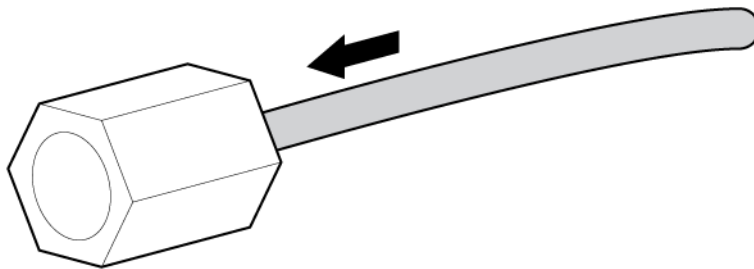
Overview: Air Pressure Base Station

The air pressure base station is a wireless device that monitors the differential pressure across areas of the data center and sends the information to the gateway.

The air pressure base station monitors and compares the difference between the pressure below the floor and the pressure above the floor.

Installing the HP Air Pressure Base Station

1. Determine the location for the air pressure base station in your data center.
2. Cut one air tube so that it can reach from the air pressure base station to the area below the floor that you want to monitor.
3. Cut the other air tube approximately 7-cm (3-inch) long.
4. Connect air diffusers to one end of each air tube.

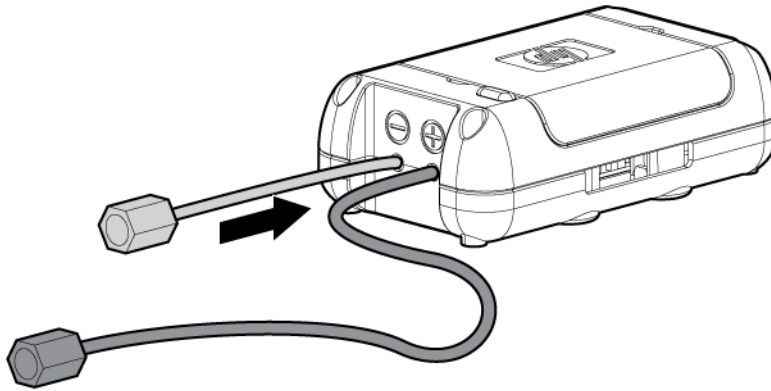


NOTE: To receive accurate air pressure readings, avoid the following locations under the sub-floor:

- Potentially turbulent air flow
- Support columns or beams
- Water pipes

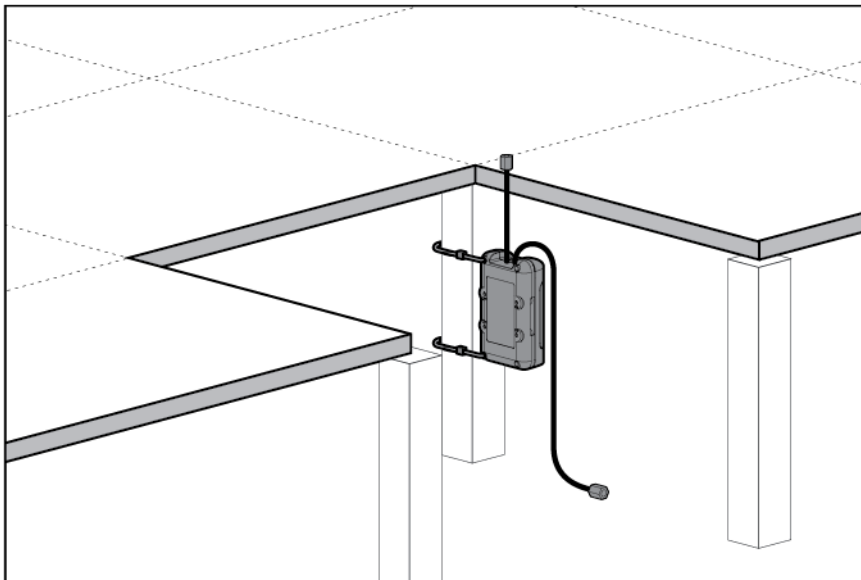
-
5. Install the long air tube. This tube monitors pressure in the desired area below the floor.
 - a. Attach a flag label indicating the positive terminal to the long air tube.
 - b. Insert the long air tube into the positive terminal on the air pressure base station.

- c. Route the air tube to the area below the floor that you want to monitor.
 - d. Use cable tie wraps to secure the air tube to a support bracket below the floor.
- 6. Install the short air tube. This tube monitors the reference pressure above the floor.
 - a. Attach a flag label indicating the negative terminal to the short air tube.
 - b. Insert the short air tube into the negative terminal on the air pressure base station. The air tube sits above the floor.

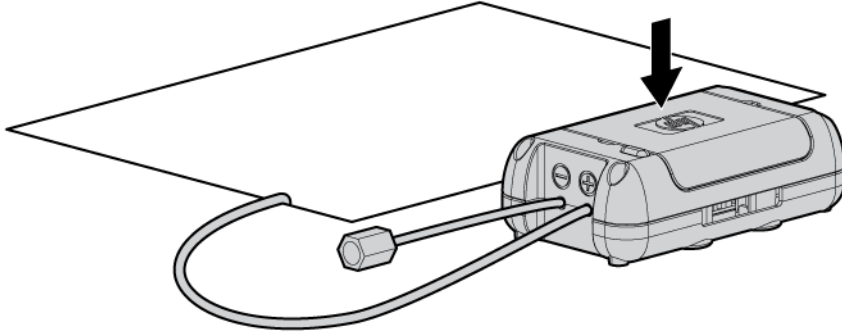


NOTE: HP recommends installing the base station below the floor tile, if possible.

- 7. Install the air pressure base station near a subfloor access location, so that the long air tube is routed under the subfloor and the short air tube is above the floor.
 - o If a support bracket is available, use cable tie wraps to secure the base station to the support bracket.



- If there is a location behind and under a rack near subfloor access, use the double-sided mounting tape to secure the air pressure base station to the floor tile near the subfloor access.



8. After all hardware is installed, power up the components ("[Power up procedure](#)" on page [70](#)). Installation is complete.

(Optional) Sensor Base Stations

Overview: (Optional) Sensor base stations

The optional sensor base stations enable HP approved third-party components to communicate wirelessly to the gateways. The sensor base stations are considered optional depending on whether you want to monitor other environmental data in your data center.

The connection between the data center component and the supplied sensor might require professional installation. However, anyone can perform the installation to connect the sensor to the sensor base station.

You can install any of the following sensor base stations:

- HP Door Position Base Station—No professional installation required.
- HP Chilled Water Energy Meter Base Station—Facility technician installation required.
- HP Water Leak Detection Base Station—Facility technician installation required.
- HP Current Sensing Relay Base Station—Professional electrician installation required.
- HP 200A Current Base Station—Professional electrician installation required.
- HP KWH Base Station—Professional electrician installation required.

You can install the optional sensor base stations on most surfaces using the double-sided mounting tape.

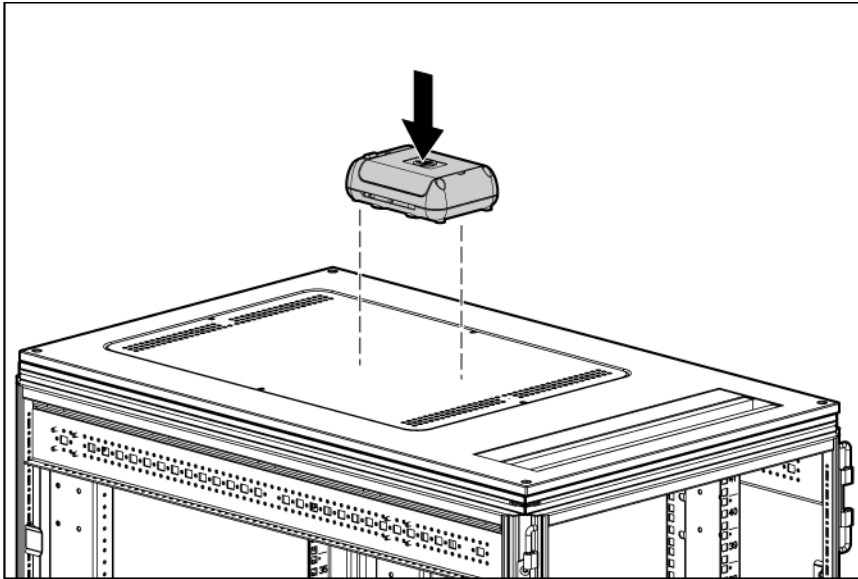
Installing the HP Door Position Base Station

The HP Door Position Base Station connects to the supplied set of door sensors and detects and reports if the door is open or closed. Ten sensors are located along a 15.2 m (50 ft) wire, which can be installed in a daisy chain series with one another to monitor multiple doors.

To install a Door Position Base Station:

1. Ensure the area on the top of the rack is free from dust before installing the base station.

2. Remove the mounting tape liner, and secure the base station to the desired location on the top of the rack.

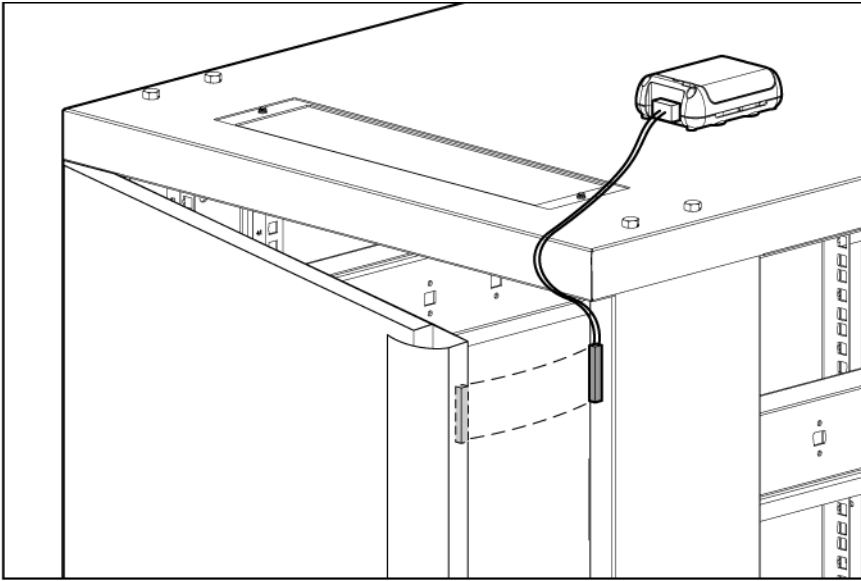


3. Remove the mounting tape liner, and secure the door position wire harness to the rack door.
4. Connect the Door Position Base Station to the door sensors.
 - a. Strip the plastic coating from the ends of the two door sensor wires.
 - b. Strip the plastic coating from the ends of the two wires on the Door Position Base Station wire harness.

NOTE: If you are only installing one door position sensor, connect the second wire to the Door Position Base Station. If you are installing the door position sensors in a daisy chain fashion, connect the second wire to the next door position sensor.

- c. Using a wire screw, twist together one wire from the door sensor with one wire from the Door Position Base Station wire harness.
- Repeat steps a through c for the other wire.

- d. Insert the connector from the Door Position Base Station wire harness into the Door Position Base Station.



5. After all hardware is installed, power up the components ("[Power up procedure](#)" on page 70).
Installation is complete.

Installing the HP Chilled Water Energy Base Station

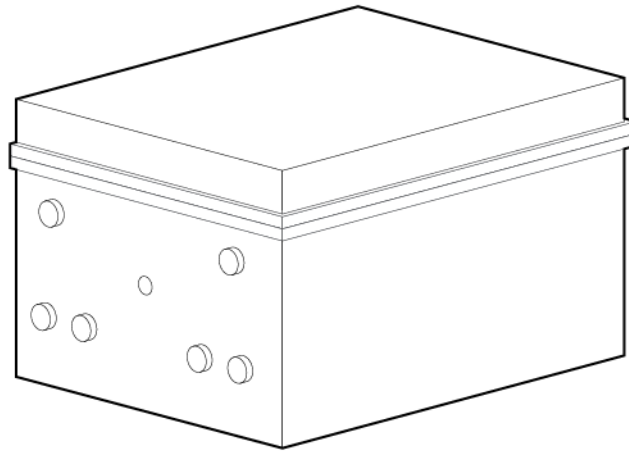
The HP Chilled Water Energy Base Station connects to the housing box, which contains an ultrasonic probe sensor. The ultrasonic sensor measures and reports liquid flow through a chilled water pipe. Temperature sensors are installed on the supply and return of the same chilled water pipe to measure the rise of the temperature as chilled water enters and exits the data center room.

Consult a facility technician to install the ultrasonic probe sensor to your chilled water pipe.

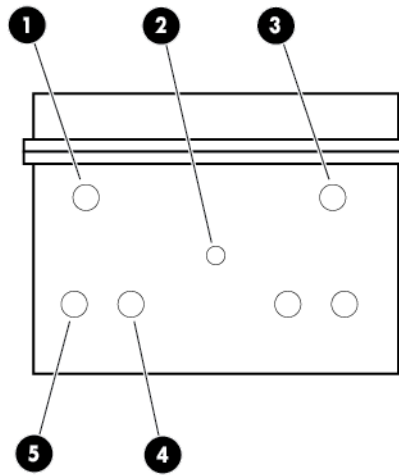
To install the Chilled Water Energy Base Station:

1. Choose a location for the housing box, relatively close to the chilled water pipes.
 - a. If a flat surface is available, remove the mounting tape liner, and secure the housing box to the surface.

- b. If a support bracket is available, use cable ties to secure the housing box to the support bracket.



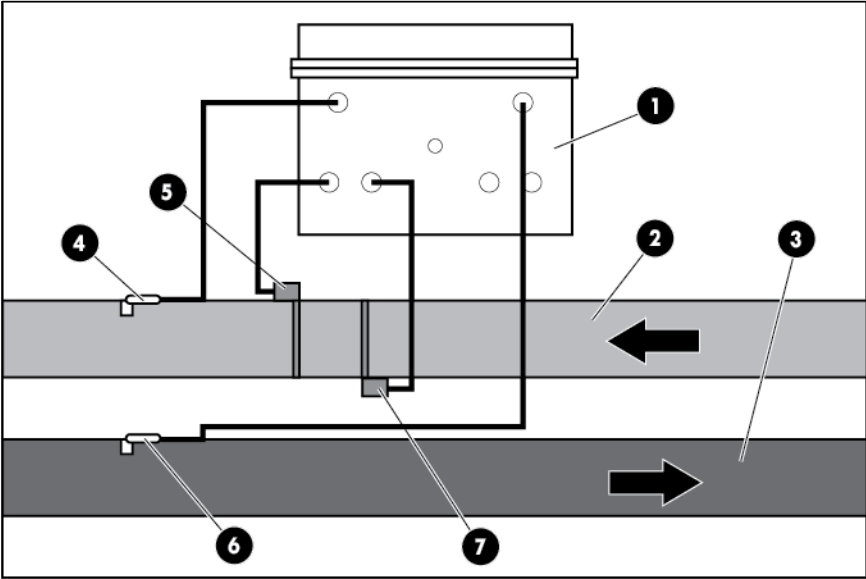
2. Route the ultrasonic probe to the appropriate locations along the chilled water pipe.
3. Connect the housing box to the required sources.



Callout	Component	Description
1	Supply temperature	Routed to the supply side of the chilled water pipe to measure temperature
2	Power connector	Connected to AC power
3	Return temperature	Routed to the return side of the chilled water pipe to measure temperature
4	Downstream flow meter	Routed to the downstream of the chilled water pipe to measure flow rate
5	Upstream flow meter	Routed to the upstream of the chilled water pipe to measure flow rate

4. After all hardware is installed, power up the components ("[Power up procedure](#)" on page 70). Installation is complete.

Single Chilled Water installation diagram

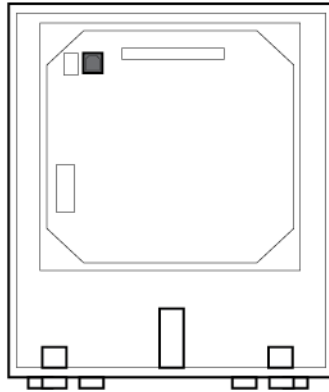


Callout	Component
1	Chilled Water Energy Base Station
2	Water supply line to the CRAH/CRAC
3	Water return line from the CRAH/CRAC
4	Water supply temperature sensor probe
5	Upstream flow meter
6	Water return temperature sensor probe
7	Downstream flow meter

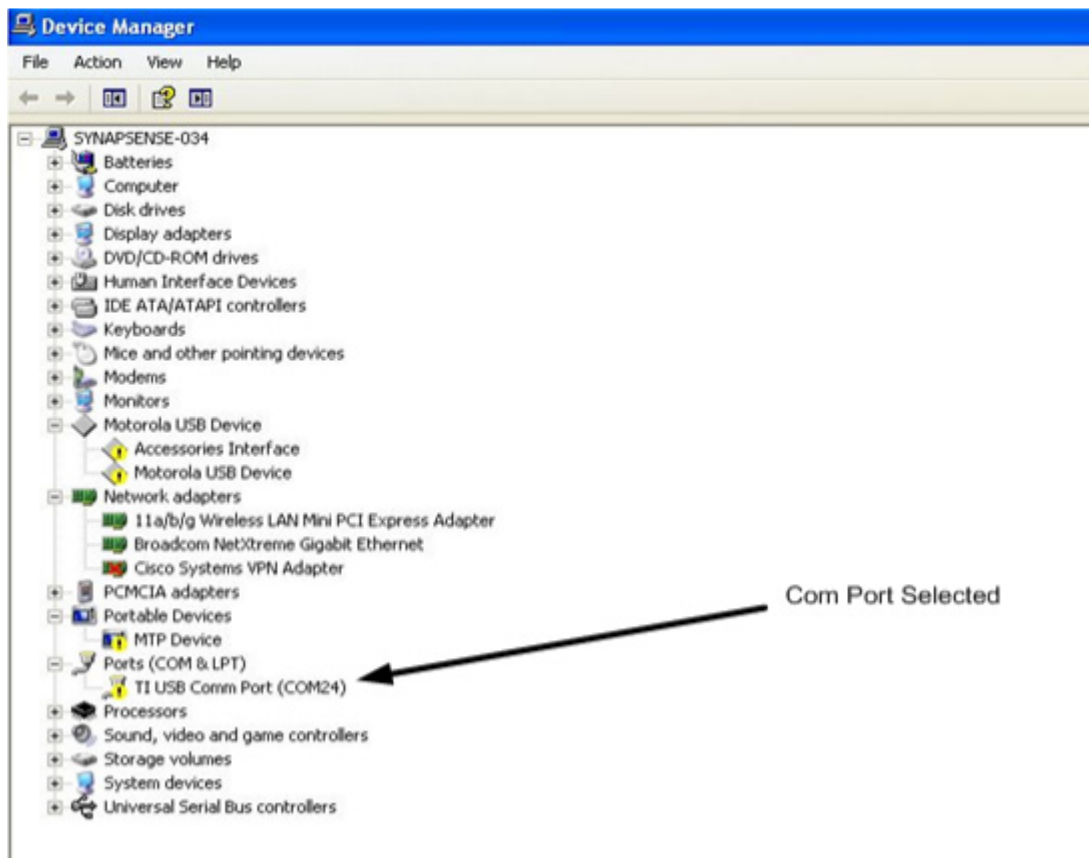
Configuring the Chilled Water Base Station

NOTE: You must have the ULTRALINK™ software installed on the PC that is configuring the base station. You can download the software from the Dynasonics website (<http://www.dynasonics.com/downloads.php>).

1. Connect a USB connector from the PC to the USB configuration port on the inside of the Chilled Water Base Station. The PC must have the Dynasonic ULTRALINK™ software installed.

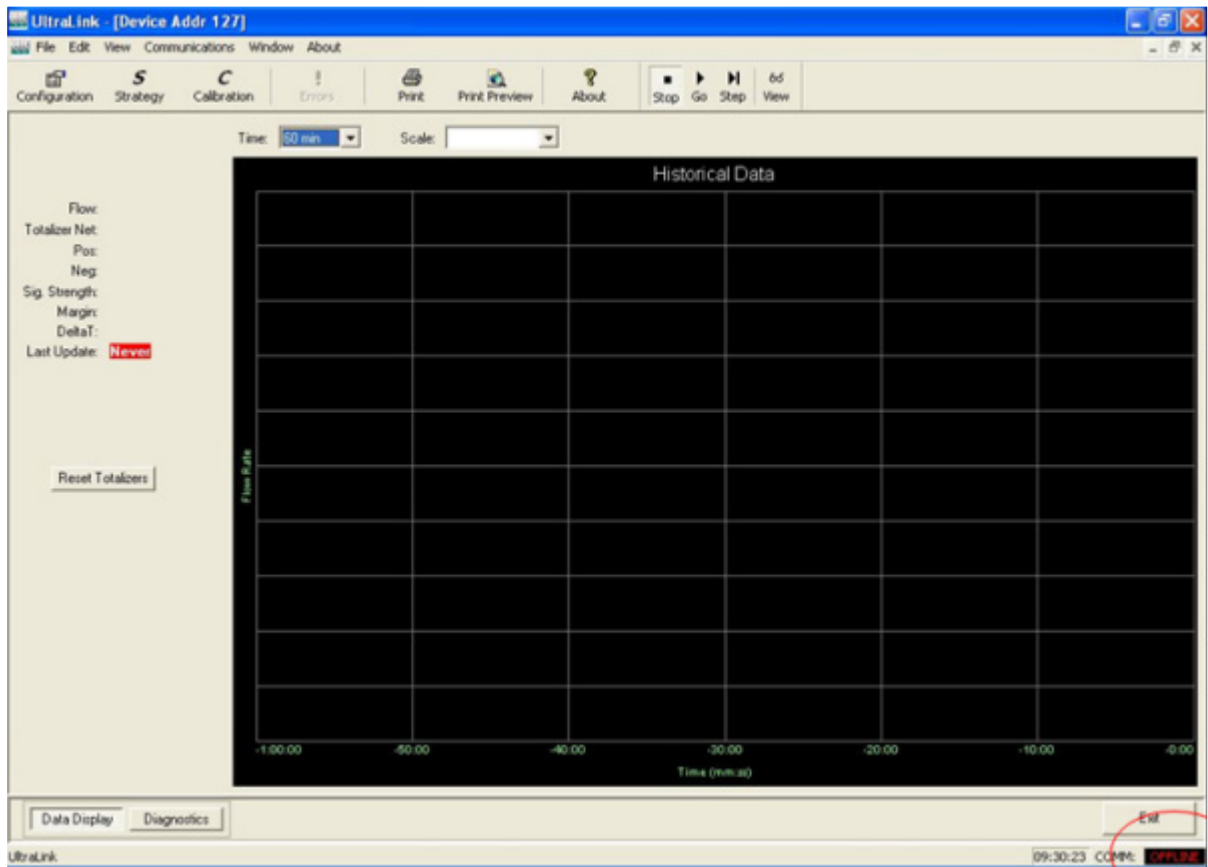


2. Open the ULTRALINK™ program.
3. When the program prompts you for a COM Port, enter the appropriate Windows®-assigned USB COM Port. To locate your COM Port, see the Device Manager screen in your Windows® operating system.

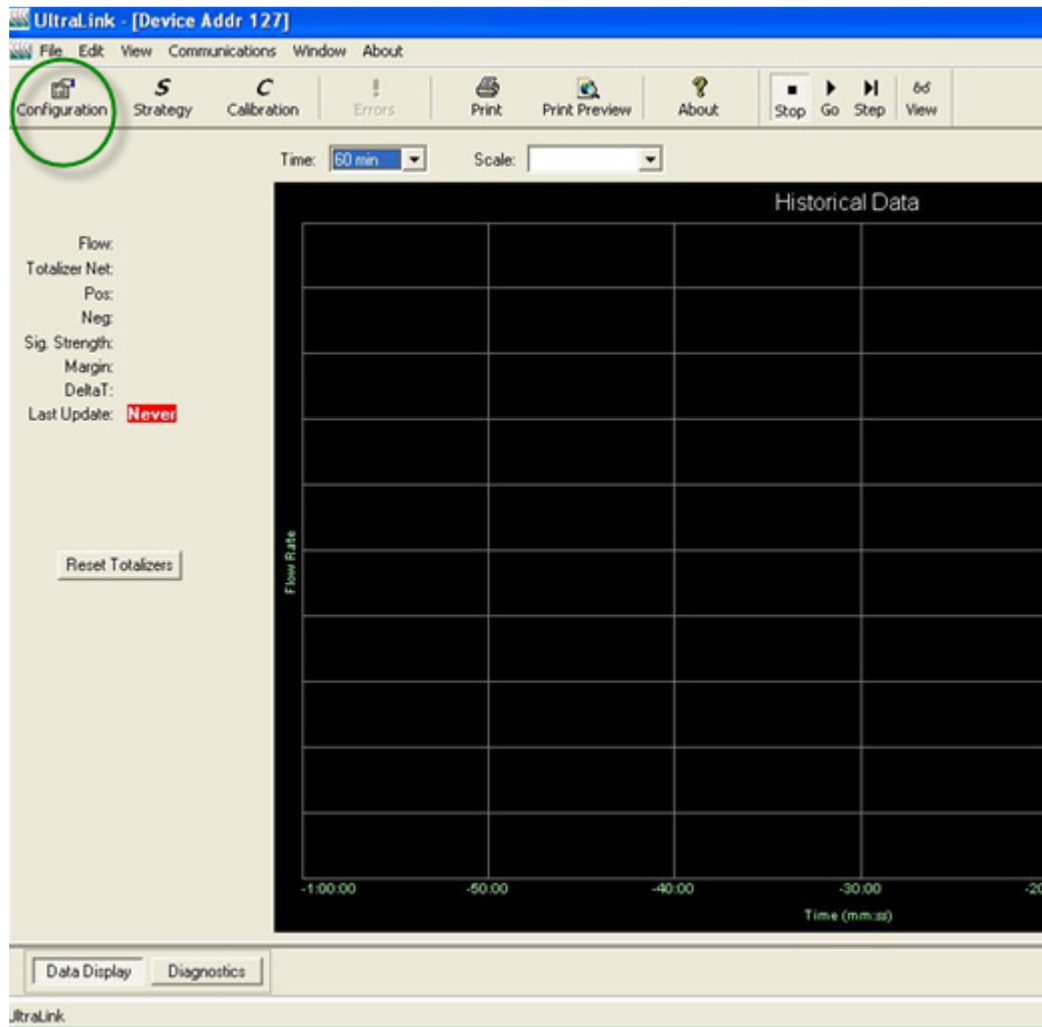


4. On the bottom, right-hand side of the home run mode screen, verify that the USB connector is communicating with the Chilled Water Base Station. A green OK indicates communication between the base station and the PC.

If a red OFFLINE error appears, select **Communications>Initialize**, and then re-enter the appropriate COM port.



5. To configure the Chilled Water Base Station, select **Configuration**.



The System Configuration window appears.

6. Select the **Basic** tab, and configure the following parameters:
- General—Select the units for the display.
 - Transducer—Select the type, mount, and frequency of the transducer.
 - Pipe—Select the material, diameter, and wall thickness of the pipe.
 - Liner—If a liner is used, select the material and thickness.

- Fluid—Select the type of water.

System Configuration

Basic | **Flow** | Filtering | Output | Security | Multichan/Multipath | Display

General
Units: English

Transducer
Type: DTTN Clamp-On 1MHZ Mount: Z Spacing: 6.19 in
Frequency: 1 MHz

Pipe
Material: Carbon Steel SoundSpeed: 10598.00 FPS Roughness: 0.000150
Pipe OD: 14 in Wall Thickness: .375 in

Liner
Material: None SoundSpeed: 0.0 FPS Roughness: 0.0
Thickness: 0.0 in

Fluid
Type: Water Tap SoundSpeed: 4911.50 FPS Abs. Viscosity: 1.00 cp
Spec. Gravity: 1.00 Spec. Heat Capacity: 1 Btu/lb °F

File Open... File Save... Download Cancel

7. Select the **Flow** tab, and configure the following parameters:

- Flow rate units—Select the measurement rates.
- Totalizer units—Select the measurement rates.
- Min flow—Select the minimum flow rate.
- Max flow—Select the maximum flow rate.

Flow on Data Display (gpm)	Flow on Data Display (liters/second)	Range (liters/second)
up to 475	up to 30	0-30
up to 950	up to 60	0-60
up to 1585	up to 100	0-100
up to 4755	up to 300	0-300

System Configuration

Basic | **Flow** | Filtering | Output | Security | Multichan/Multipath | Display

Flow Rate Units: /

Totalizer Units:

Min Flow: Ltr/S

Max Flow: Ltr/S

Low Flow Cutoff: %

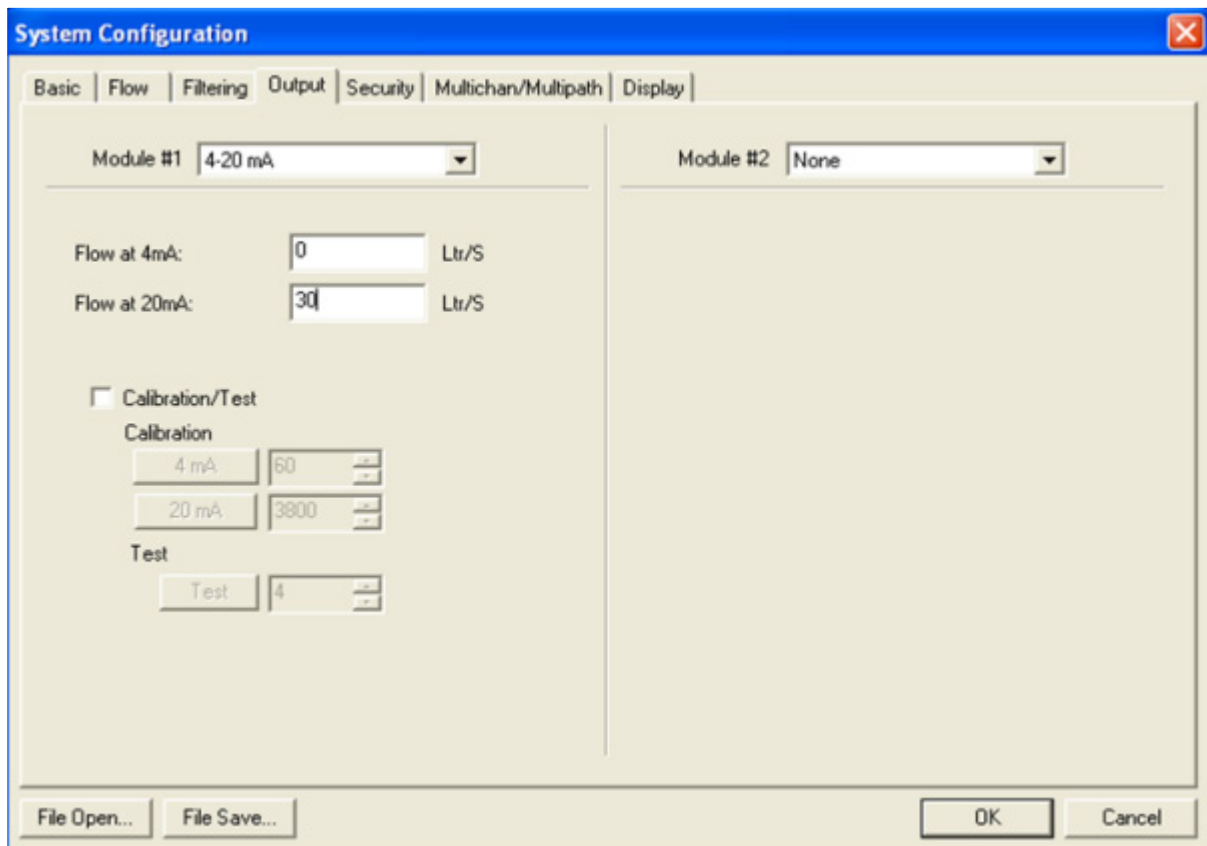
Low Signal Cutoff:

Substitute Flow: %

File Open... File Save... Download Cancel

8. Select the **Output** tab, and configure the following parameters:
 - Module #1—Select the volumetric flow and energy transmitted to the console.
 - Flow at 4mA (Min flow)—Select the minimum flow rate. This must match the parameters set on the Flow tab.

- Flow at 20mA (Max flow)—Select the maximum flow rate. This must match the parameters set on the Flow tab.



The image shows a 'System Configuration' dialog box with a blue title bar and a close button in the top right corner. The 'Flow' tab is selected, showing configuration options for two modules. Module #1 is set to '4-20 mA' and Module #2 is set to 'None'. For Module #1, the flow rate at 4mA is set to 0 Ltr/S and at 20mA is set to 30 Ltr/S. There is an unchecked checkbox for 'Calibration/Test'. Under 'Calibration', the 4 mA point is set to 60 and the 20 mA point is set to 3800. Under 'Test', the Test value is set to 4. At the bottom, there are buttons for 'File Open...', 'File Save...', 'OK', and 'Cancel'.

Module	Module #	Flow at 4mA (Ltr/S)	Flow at 20mA (Ltr/S)	Calibration 4 mA	Calibration 20 mA	Test
Module #1	4-20 mA	0	30	60	3800	4
Module #2	None					

9. Select the **Basic** tab, and then select **Download** to transfer the new settings into the Chilled Water Base Station.

System Configuration

Basic | Flow | Filtering | Output | Security | Multichan/Multipath | Display

General
Units: English

Transducer
Type: DTTN Clamp-On 1MHZ Mount: Z Spacing: 6.19 in
Frequency: 1 MHz

Pipe
Material: Carbon Steel SoundSpeed: 10598.00 FPS Roughness: 0.000150
Pipe OD: 14 in Wall Thickness: .375 in

Liner
Material: None SoundSpeed: 0.0 FPS Roughness: 0.0
Thickness: 0.0 in

Fluid
Type: Water Tap SoundSpeed: 4911.50 FPS Abs. Viscosity: 1.00 cp
Spec. Gravity: 1.00 Spec. Heat Capacity: 1 Btu/lb °F

File Open... File Save... Download Cancel

10. Select **OK** to save the configuration settings and close the System Configuration window.

Testing the configuration

The 4mA and 20mA calibration values are factory set and must not be modified. If you modify these calibration values and select **Download**, you will override the 4-20mA factory preset.

You can test the analog flow meter output for troubleshooting purposes. The Test field represents the Flow Meter 4-20mA analog output value, but not the flow rate. The minimum value is 4 and the maximum value is 20.

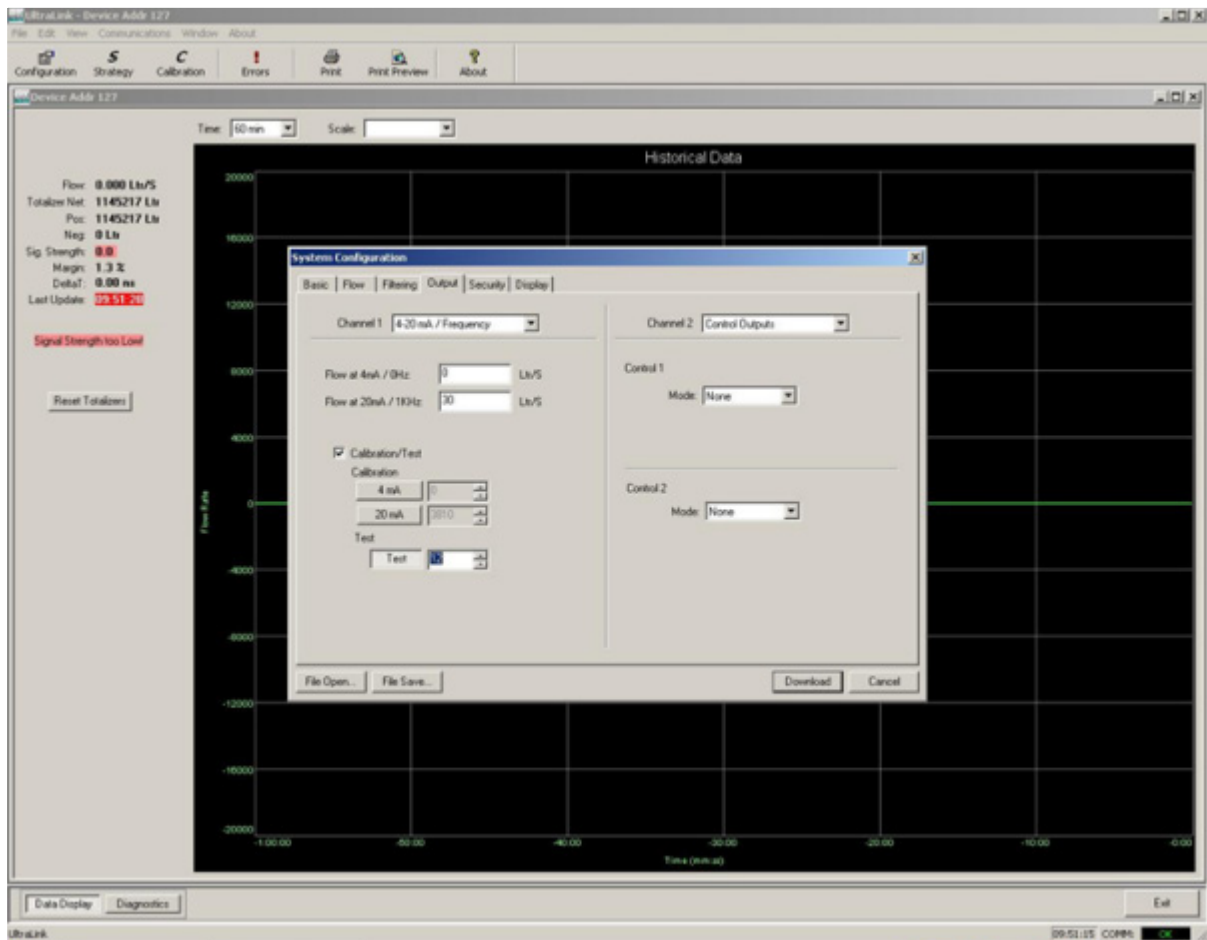
NOTE: Do not select **Download** during the testing or calibration process.

To test the calibration:

1. Select the **Calibration/Test** box. The Calibration and Test fields are now active.
2. Using whole numbers, adjust the Test field.
3. Verify the flow rate on the console matches the calibration of your flow rate.

Example:

The flow at 4mA is 0 l/s and the flow at 20mA is 30 l/s. If the Test field is set to 4, then the flow rate on the console must be 0 l/s. If the Test field is set to 20, then the flow rate on the console must be 30 l/s.



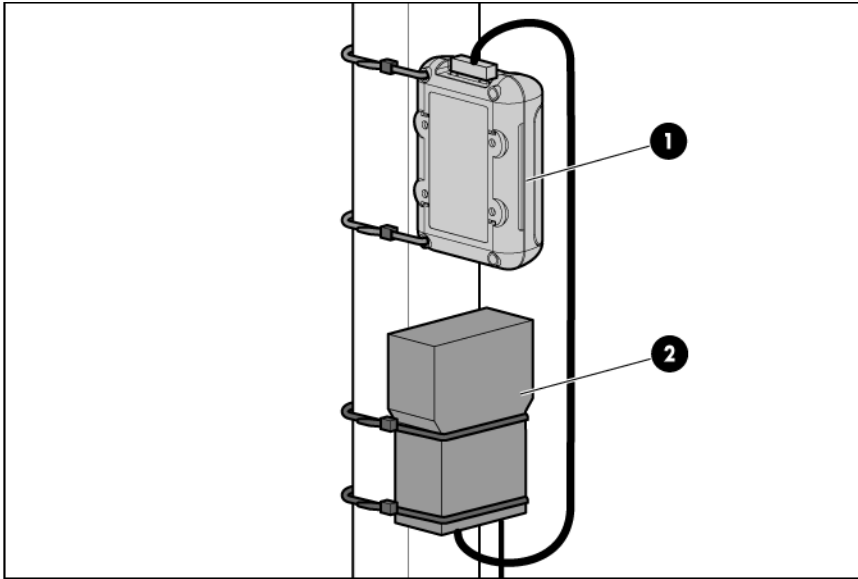
Installing the HP Water Leak Detector Base Station

The HP Water Leak Detector Base Station connects to the supplied leak detector sensor and detects and reports the presence of any fluid along the sensing cable.

To install the Water Leak Detector Base Station:

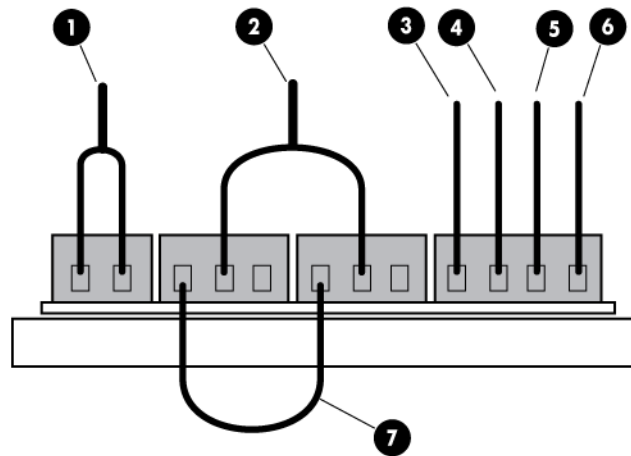
1. Determine the ideal location for the base station and the water leak detector.

2. If a support bracket is available, use cable ties to secure both the base station (1) and the water leak detector (2) to the support bracket.



3. Connect the leak detector sensing cable assembly to the Water Leak Detector.
 - a. Cut approximately 5-cm (2-inch) of wire from the end of the wire harness.
 - b. Strip the plastic coating from the ends of the wire you just cut to create a jumper wire.
 - c. Strip the plastic coating from the two wire pairs on the wire harness.
 - d. Strip the plastic coating from the white jumper cable to expose four colored wires.
 - e. Using the supplied Allen wrench, loosen the two screws on the ends of the Water Leak Detector to remove the lid.
 - f. Using a flathead screwdriver, loosen the four screws on the CABLE INPUT terminal block.
 - i. Insert and tighten the green wire in the G terminal.
 - ii. Insert and tighten the red wire in the R terminal.
 - iii. Insert and tighten the white wire in the W terminal.
 - iv. Insert and tighten the blue wire in the B terminal.
 - g. Loosen the C terminals on the LEAK terminal block and the FAULT terminal block.
 - i. Insert and tighten the non-labeled white wire from the wire harness in the LEAK terminal block.
 - ii. Insert and tighten the non-labeled black wire from the wire harness in the FAULT terminal block.
 - h. Loosen the NC terminals on the leak terminal block and the fault terminal block.
 - i. Insert and tighten one end of the jumper wire in each NC terminal.
 - j. Loosen the + (positive) and - (negative) contact screws in the 5V DC IN terminal block.
 - i. Insert and tighten the white wire labeled 5V from the wire harness in the + (positive) terminal.
 - ii. Insert and tighten the black wire labeled 5V from the wire harness in the - (negative) terminal.

- k. Replace the Water Leak Detector lid, and use the supplied Allen wrench to tighten the two screws to secure the lid.

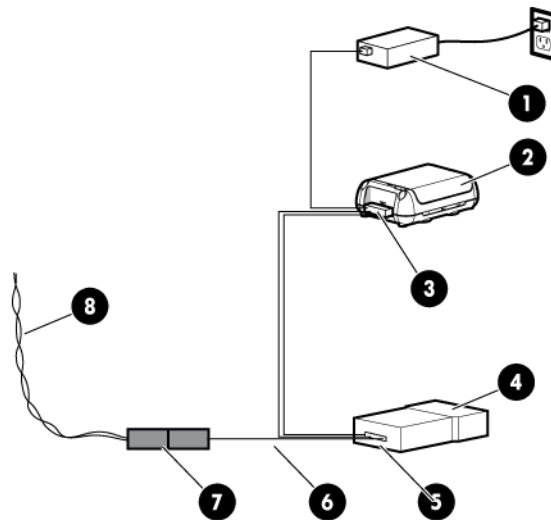


Callout	Component	Description
1	5VDC IN	Insert the white wire into the + (positive) terminal. Insert the black wire into the - (negative) terminal.
2	Fault and Leak	
3	W terminal	Insert the white wire from the wire harness.
4	B terminal	Insert the black wire from the wire harness.
5	G terminal	Insert the green wire from the wire harness.
6	R terminal	Insert the red wire from the wire harness.
7	NC jumper wire	Connect the Fault and Leak terminals.

4. Insert the leak detection cable in to the water leak detector sensor and tighten the connector.
5. Route the sensing cable along the sub-floor, in strategic locations, to detect the presence of fluid.
6. Connect the Water Leak Detector to the base station.
7. Connect one end of the AC adapter to the power input connector on the Water Leak Detector wire harness, and then plug the other end of the AC adapter into a power source. The base station automatically powers up and follows the Base Station LED sequence.

Installation is complete.

Water Leak Detector installation diagram



Callout	Component	Description
1	AC adapter	Plugs into a power source
2	Base station	Wirelessly transmits information to the Edge server
3	Connection point	Connects the base station to the water leak detector
4	Water leak detector	Processes the detection of fluid
5	Connection point	Connects the water leak detector to the jumper cable
6	Jumper cable	Connects the sensing cable to the water leak detector
7	Connector	Connects the jumper cable to the sensing cable assembly
8	Sensing cable assembly	Detects any fluid

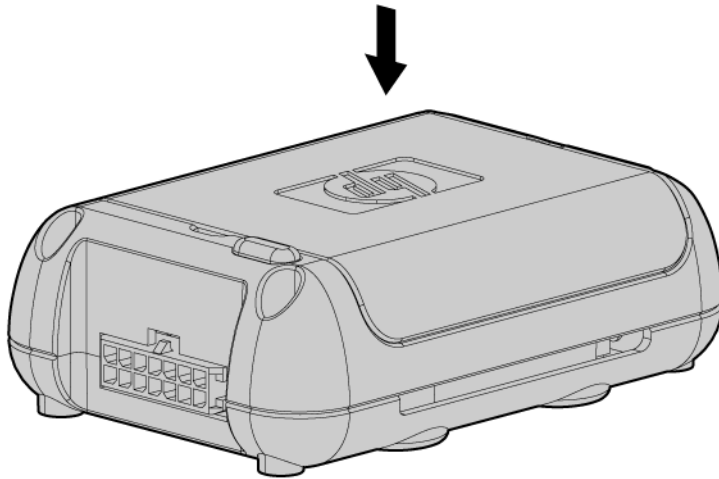
Installing the HP Current Sensing Relay Base Station

The HP Current Sensing Relay Base Station uses one CT to measure and report the current flowing to electrical equipment, and is typically used to determine whether the equipment is powered on or off. Consult a professional electrician to install the current sensor.

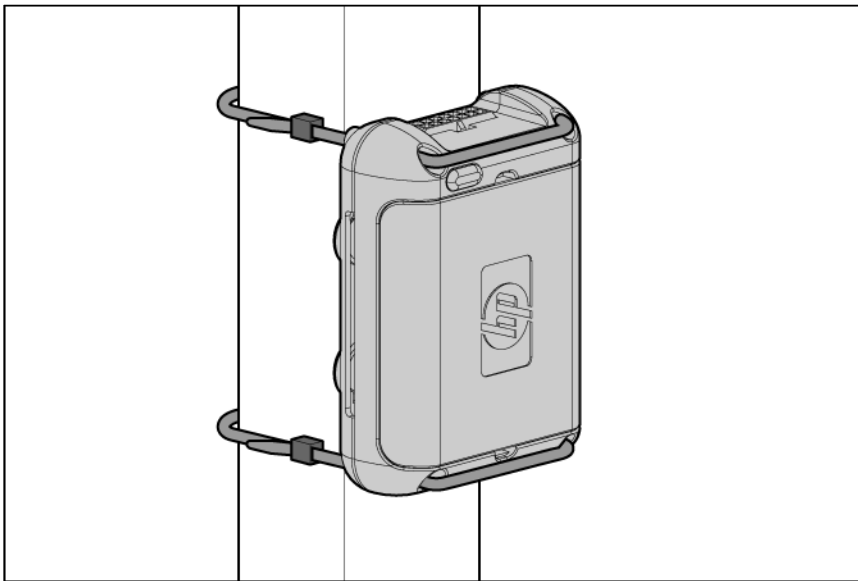
To install a Current Sensing Relay Base Station:

1. Determine the ideal location for the base station, relative to your electrical equipment.

- a. If a flat surface is available, remove the mounting tape liner and secure the base station to the surface.

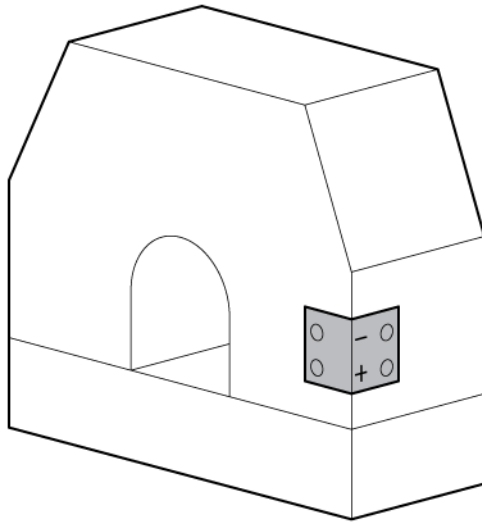


- b. If a support bracket is available, use cable ties to secure the base station to the support bracket.



2. Connect the Current Sensing Relay Base Station to your current sensor.
 - a. Strip the plastic coating from the ends of the two wires on the wire harness labeled CH 3.
 - b. Using a flathead screwdriver, secure the white wire to the positive terminal block on the current sensor transducer.

- c. Using a flathead screwdriver, secure the black wire to the negative terminal block on the current sensor transducer.



- d. Insert the connector from the wire harness into the Current Sensing Relay Base Station.
3. Connect one end of the 24V AC adapter to the power input connector on the base station, and then plug the other end of the AC adapter into a power source. The base station automatically powers up and follows the Base Station LED sequence.



IMPORTANT: Verify that the jumper setting of the CT matches the amperage of the electrical equipment you connect it to.

4. Adjust the jumper setting of the CT to match the amperage of the electrical device.
 - o Low—0-100 amps
 - o Medium—0-150 amps
 - o High—0-200 amps

Installation is complete.

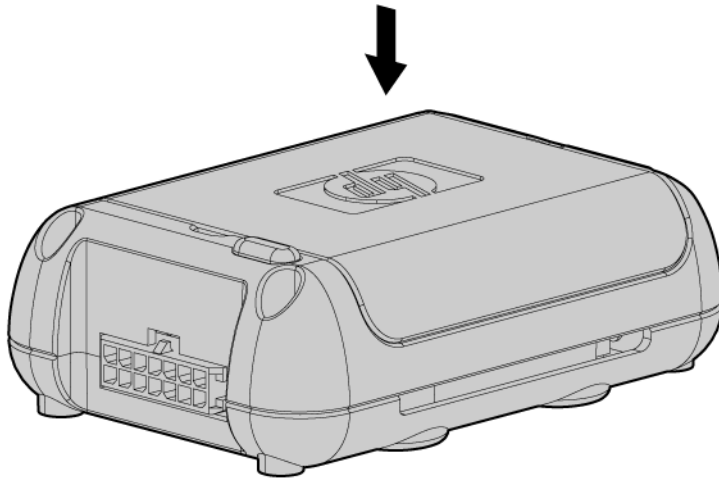
Installing the HP 200A Current Base Station

The HP 200A Current Base Station connects to the supplied current sensor and measures and reports the current flowing to electrical equipment. The base station provides three channels to monitor three different power line feeds. Consult a professional electrician to install the current sensor to your component.

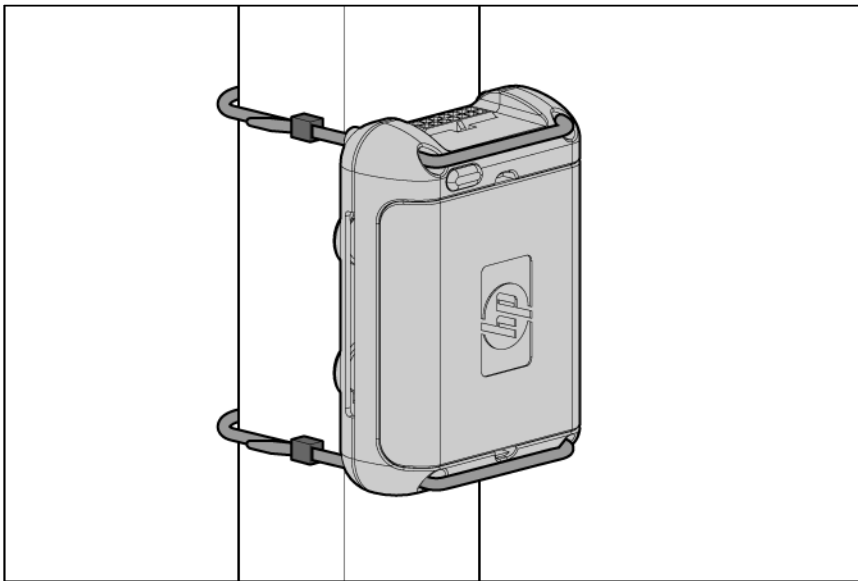
To install a 200A Current Base Station:

1. Determine the ideal location for the 200A Current Base Station, relative to your current sensor.

- a. If a flat surface is available, remove the mounting tape liner and secure the base station to the surface.

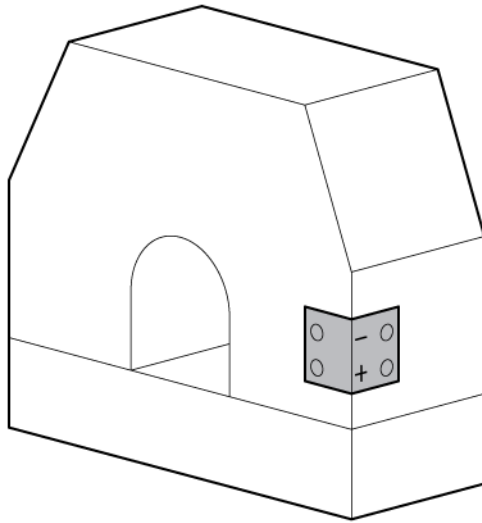


- b. If a support bracket is available, use cable ties to secure the base station to the support bracket.



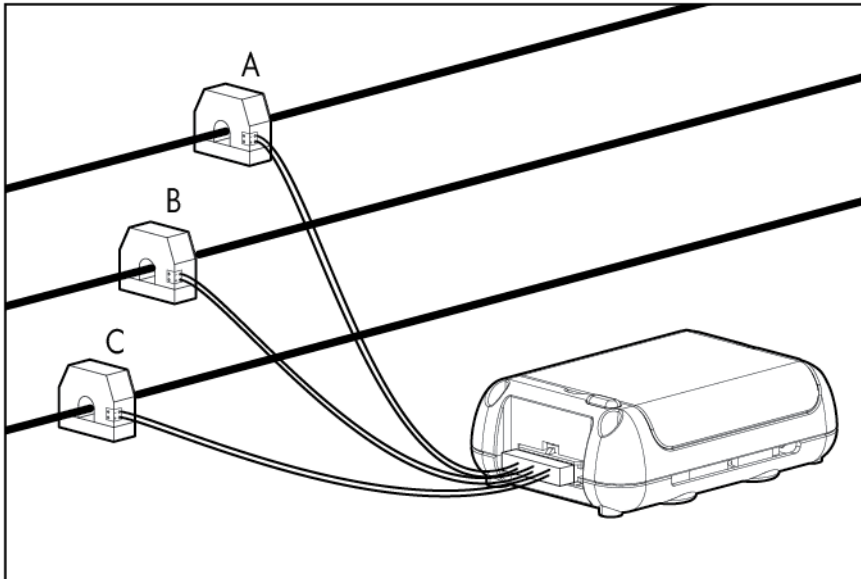
- 2. Connect the 200A Current Base Station to your current sensor.
 - a. Strip the plastic coating from the ends of the two wires on the wire harness labeled CH 3/Current A.
 - b. Using a flathead screwdriver, secure the white wire to the positive terminal block on the current sensor transducer.

- c. Using a flathead screwdriver, secure the black wire to the negative terminal block on the current sensor transducer.



Repeat for the other two current transducers (CH 4 and CH 5/Current B and Current C).

- d. Insert the connector from the wire harness into the 200A Current Base Station.



3. Connect one end of the 24V AC adapter to the power input connector on the 200A Current Base Station, and then plug the other end of the AC adapter into a power source. The base station automatically powers up and follows the Base Station LED sequence.

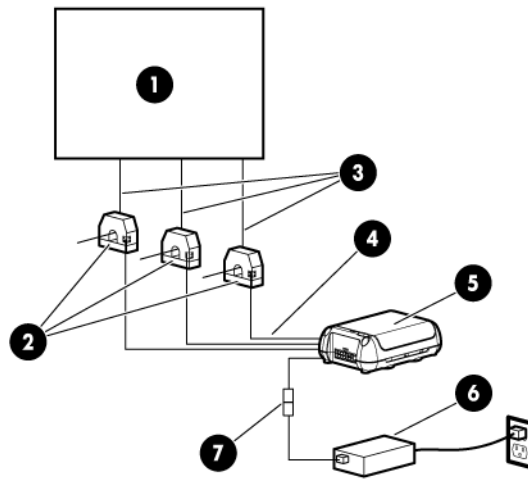


IMPORTANT: Verify that the jumper setting of the CT matches the amperage of the electrical equipment you connect it to.

4. Adjust the jumper setting of each CT to match the amperage of the electrical device it is connected to.
- Low—0-100 amps
 - Medium—0-150 amps
 - High—0-200 amps

Installation is complete.

200A Current installation diagram



Callout	Component	Description
1	Power device	Any power component whose power current you want to measure
2	CH3, CH4, and CH5 CTs	Three separate current transducer channels to measure three current lines
3	Current lines	Three separate current lines measured by the CTs
4	Connection point	Low voltage wires connecting the CTs to the base station
5	Base station	Wirelessly transmits information to the Edge server
6	AC adapter	Plugs into a power source
7	Connector	Connects the base station to the AC adapter

Installing the HP Energy Base Station

The HP Energy Base Station connects to the supplied ION energy meter sensor, and then measures and reports the energy usage of the monitored power source or location. Consult a professional electrician to install the ION power meter sensor to your power source.

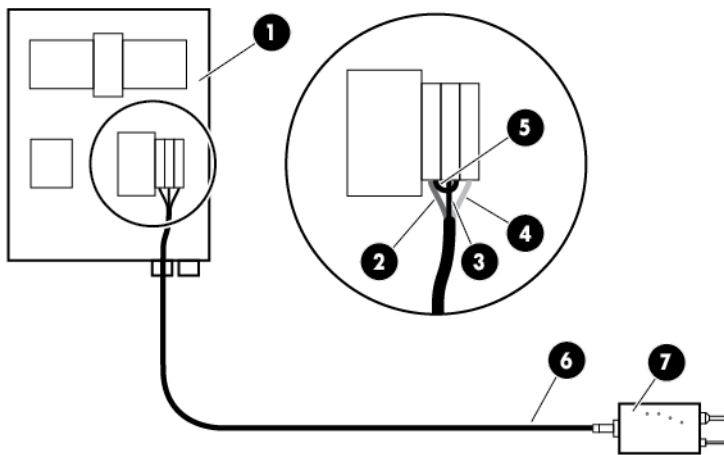
Depending on the power configuration of your energy meter, the following KWH Base Stations are available:

- HP 208V/200A KWH Base Station
- HP 208V/600A KWH Base Station
- HP 480V/200A KWH Base Station
- HP 480V/600A KWH Base Station

The installation procedure is the same for all Energy base stations. To install a KWH base station:

NOTE: A licensed electrician must install the ION power meters to the designated locations of the data center.

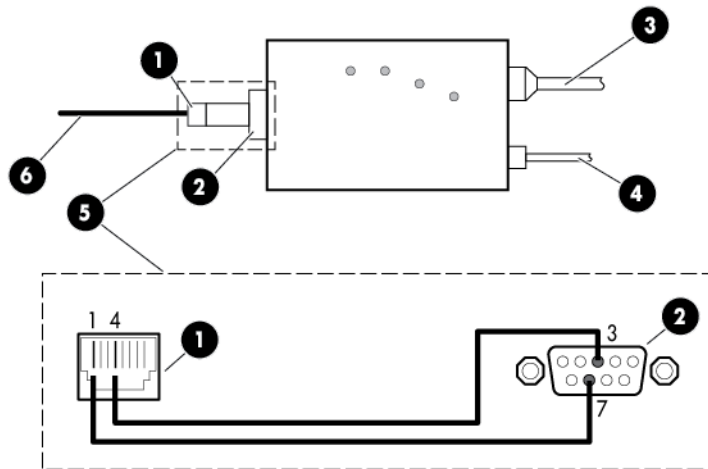
1. Choose the location for the Energy Base Station, relative to your energy meter.
2. Connect the Energy Base Station to your energy meter.
 - a. Strip the plastic coating from the ends of the two wires on the Energy Base Station wire harness.
 - b. Open the energy meter.
 - c. Using a small screwdriver, loosen the 1K and COM terminals.
 - d. Insert the end of the red wire into the 1K terminal.
 - e. Insert the end of the black wire into the COM terminal.
 - f. Using a small screwdriver, tighten the 1K and COM terminals.
 - g. Insert the connector from the Energy Base Station wire harness into the Energy Base Station.



Callout	Component	Description
1	Energy meter	Meter wiring terminal blocks
2	RS-485 (+ terminal)	Insert the red wire from the wire harness.
3	RS-485 (- terminal)	Insert the black wire from the wire harness.
4	RS-485 (ground/shield)	Insert the silver wire from the wire harness.
5	RS-485 bus terminating resistor	Installed on the last meter of a RS-485 daisy chain
6	RS-485 cable	Connects the ION meter to the Modbus base station
7	Modbus base station	Communicates data from the energy meter to the Edge server via Ethernet

3. Using an RS-485 cable, connect the ION power meters in a daisy chain to the Modbus base station.
4. Using an Ethernet cable, connect the Modbus base station to the Edge server network.
Verify that the pins of the adapter are connected in the correct orientation:
 - o RS-485 (+): Pin 1 (RJ-45 connector) to Pin 7 (RS-232 connector)

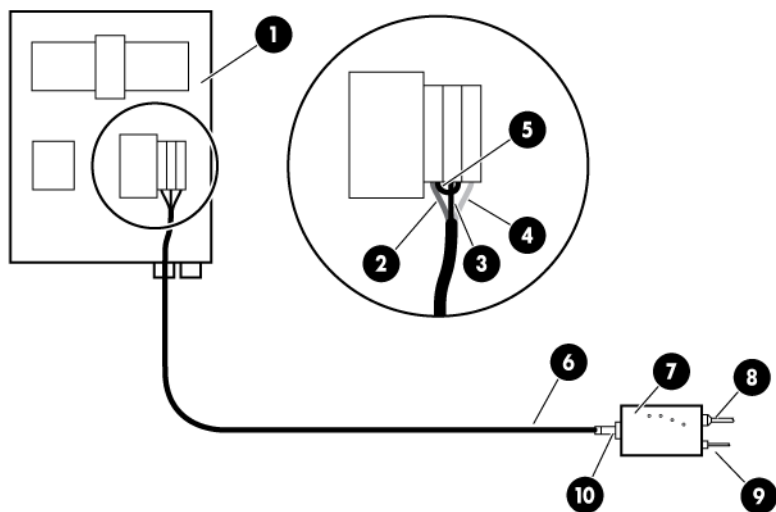
- RS-485 (-): Pin 4 (RJ-45 connector) to Pin 3 (RS-232 connector)



Callout	Component	Description
1	RJ-45 Ethernet connector	Component of the Modbus adapter
2	RS-232 connector	Component of the Modbus adapter
3	A/C power connector	Connects to the power source
4	CAT5 Ethernet connector	Connects to the network
5	Modbus adapter (RJ-45 to RS-232)	Connects the RJ-45 connector to the RS-232 connector
6	RS-485 cable	Connects the energy meter to the Modbus base station

5. Verify that the ION power meters are configured and meet all requirements.
 6. After all hardware is installed, power up the components ("[Power up procedure](#)" on page 70).
- Installation is complete.

Energy Base Station installation diagram



Callout	Component	Description
1	Energy meter	Energy meter(with housing case removed) you want to measure
2	RS-485 (+ terminal)	RS-485 (+)
3	RS-485 (- terminal)	RS-485 (-)
4	RS-485 (ground/shield)	RS-485 (ground wire)
5	RS-485 bus terminating resistor	If a single energy meter is connected to the Modbus base station, the terminating resistor must be installed. If multiple energy meters are connected to the Modbus base station, in a daisy chain, the terminating resistor is installed only on the last energy meter.
6	RS-485 wire	RS-485 wire routed from the energy meter to the Modbus base station
7	Modbus base station	Transmits data from the energy meter to the Edge server via Ethernet
8	RJ-45 Ethernet connector	Connects to Ethernet network
9	AC power connector	Connects to power source
10	Modbus adapter (RJ-45 to DB-9)	Connection point between the energy meter and the Modbus base station

Programming the ION power meter

You must be standing at the ION power meter to program the device. It is not capable of remote programming.

1. Press and hold the **UP** and **DOWN** arrows simultaneously for a minimum of 2 seconds to access the programming mode.
2. Press the **KVARh** button to scroll through the available modes.
3. Press and hold the **UP** or **DOWN** arrow for a minimum of 2 seconds to move from digit to digit when adjusting values.

4. Press and hold the **UP** and **DOWN** arrows simultaneously for a minimum of 2 seconds to exit.



Programming the voltage mode

Set the Volts Mode type according to the specific power connection type.

Power connection type	ION setting
4wire wye (4 wire, 3 phases + neutral)	4W
Direct Delta (3 wire, 3 phases, no neutral)	dELd



Programming the CT model

NOTE: All of the CTs must have the same ratings.

Set the primary and secondary transducer values:

- Primary transducer type—Ct1
- Secondary transducer type—Ct2

An example of a 200A CT is:

- Ct1 = 200
- Ct2 = 5

Programming the digital out

1. Set the following values.

Digital out	ION setting
out1	wh
Tc1	0.5

NOTE: You cannot verify the CT polarity if you are in the Direct Delta voltage mode. To verify the CT polarity, temporarily switch the meter to 4W mode. After the polarity is verified, switch back to dELd mode. For more information, see Programming the voltage mode (on page 58).

2. Verify the CT polarity by reading the current phase values.

If the polarity is backwards, then the - light is on for each CT. Return to the programming mode and change CPL1, CPL2, and CPL3 to inv. The polarity is automatically reversed, as if you reversed the black and white wires.

Programming Modbus communication

The ION6200 Energy Meter supports 2wire with shielded RS-485 connection. You can connect multiple meters (up to 32) in a daisy chain series, in which case, the last meter of the series must have the terminating resistor installed. For more information, see Installing the HP 480V/200A-600A Energy Base Station.

Programming the Modbus ID

1. Set the protocol to Modbus (Mod).



NOTE: The Modbus ID is default to 1xx, where the xx is the last two digits of the unit serial number.

2. Set the device unit ID to a number value between 1 and 32. If multiple meters are connected in a daisy chain series, each meter must have a unique device unit ID.



NOTE: The baud rate you set on the ION Energy Meter Modbus ID ("[Programming the Modbus ID](#)" on page 59) must match the baud rate you set in the Modbus Base Station configuration ("[Configuring the Modbus Base Station](#)" on page 61).

3. Set the serial baud rate to 19.2K.

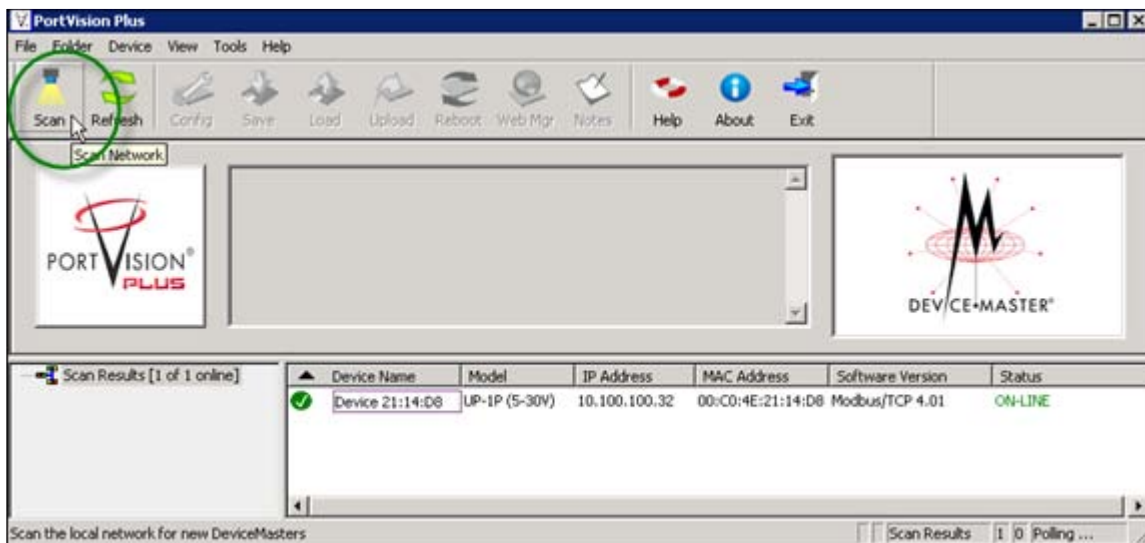


4. Set the power scale (PPS) to 10x.

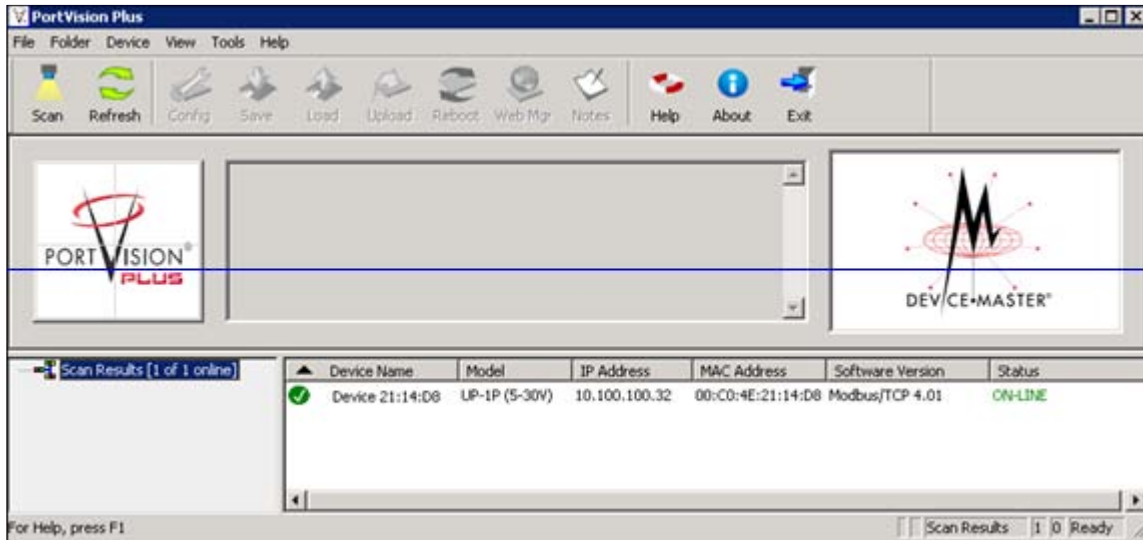


Configuring the Modbus Base Station

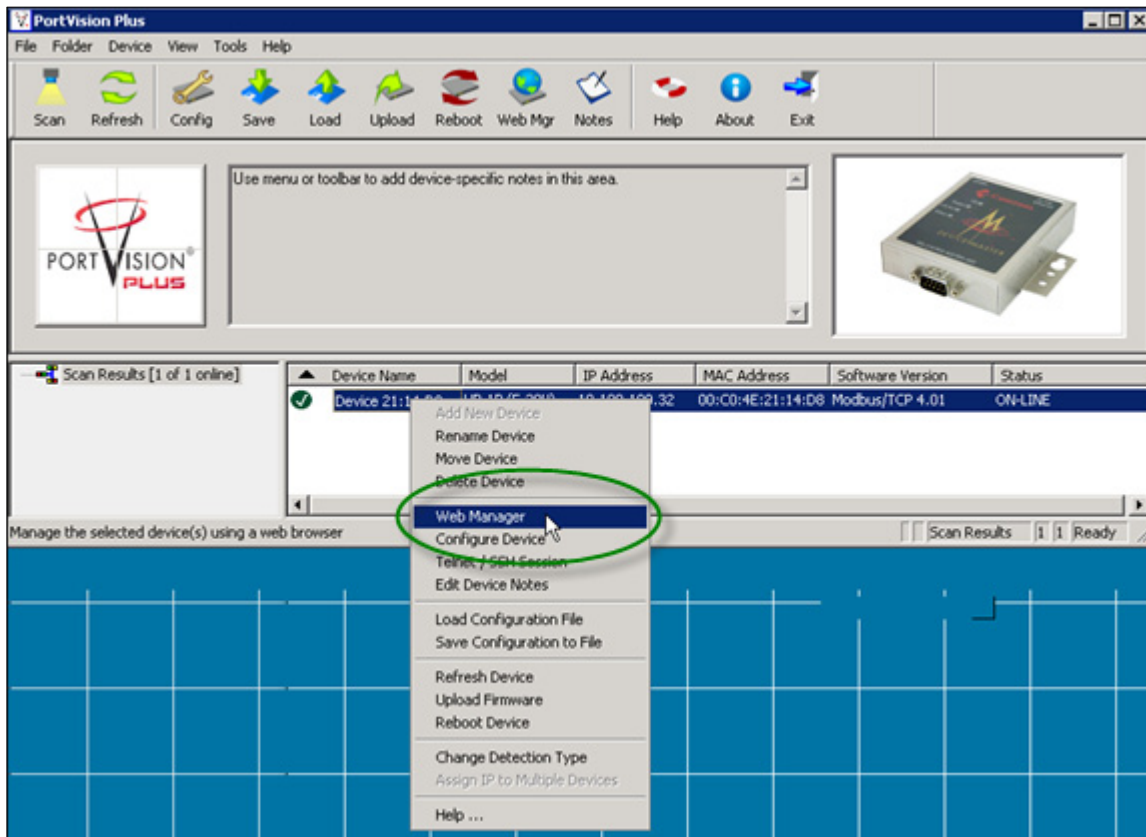
1. Go to the Control website (<http://www.control.com>), download and install Port Vision Plus software. Port Vision Plus software is used to locate, configure, and manage DeviceMasters over a network.
2. Select the **Scan** button to discover the Modbus base station.



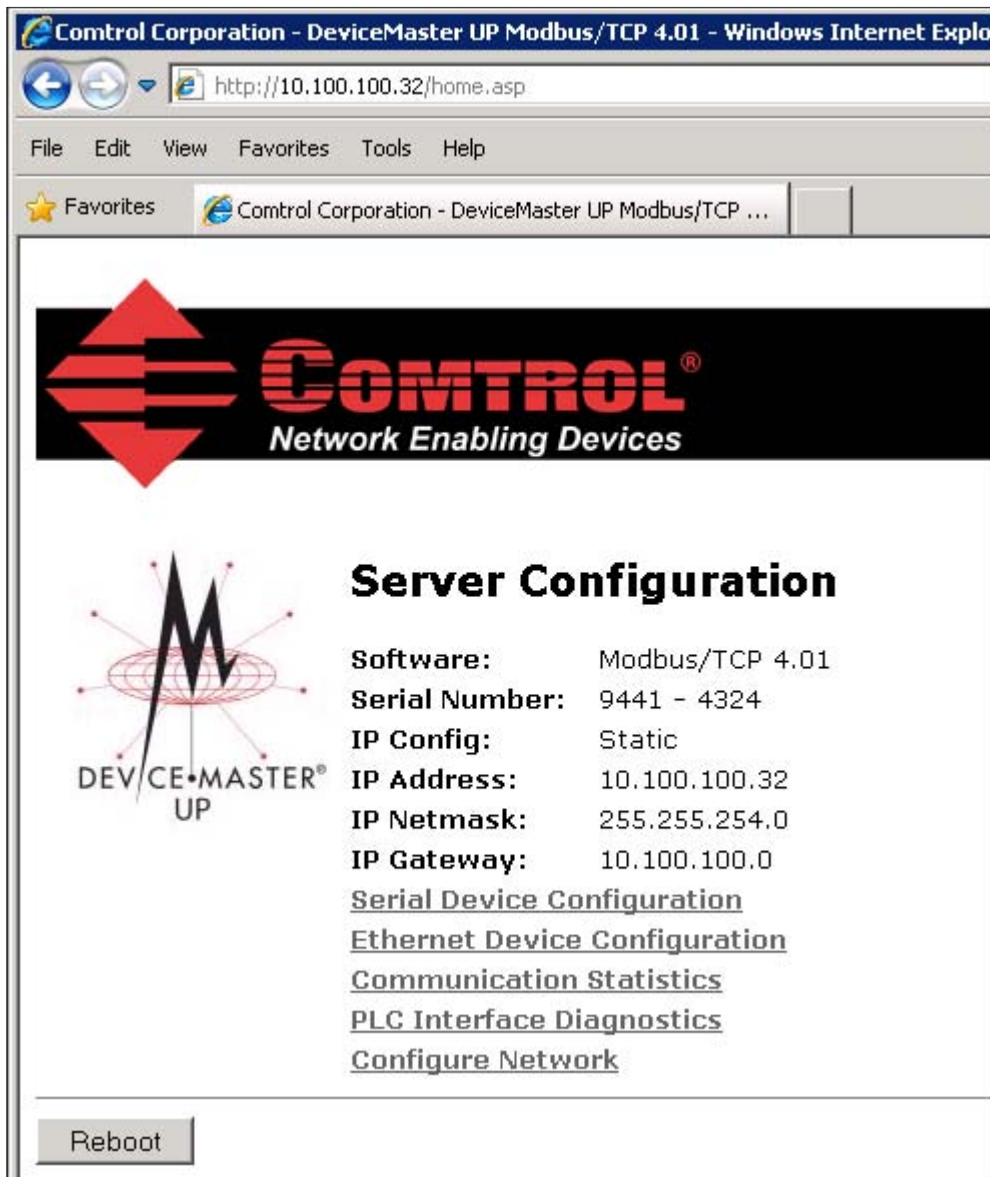
The Scan results appear.



3. Right-click the Modbus base station you want to configure and select **Web Manager**.



The main Control Web Manager main page appears.



4. Configure the device network settings.


- a. From the main page, select **Configure Network**. The Edit Network Configuration page appears.

Control Corporation - DeviceMaster UP Modbus/TCP 4.01 - Windows Internet Explorer

http://10.100.100.32/netCfg.asp?

File Edit View Favorites Tools Help

★ Favorites Control Corporation - DeviceMaster UP Modbus/TCP ...

 **CONTROL**[®]
Network Enabling Devices

Edit Network Configuration

IP Configuration: ☐ Use DHCP
☒ Use static configuration below:

IP Address:

Netmask:

Gateway:

- b. Enter the IP address properties, as provided by the network administrator.
 - c. Select **Save**.
5. Configure device serial settings.

- a. From the main page, select **Serial Device Configuration**. The Serial Device Configuration page appears.

Serial Device Configuration

[Server Configuration Home](#)
[Ethernet Device Configuration](#)
[Communication Statistics](#)
[PLC Interface Diagnostics](#)

Serial Port Settings

Port 1
Mode: RS-485
Baud: 9600
Parity: none
Data Bits: 8
Stop Bits: 1
Flow: none
DTR: off
Rx Timeout Between Packets: 200

General Protocol Settings

Serial Port Protocol: Modbus/RTU
Discard Rx Pkts With Errors: no

Modbus/RTU Protocol Settings

Response Timeout (ms): 250

Serial Packet ID Settings (Raw-Data Only)

STX Rx Detect: N/A
STX Rx: N/A
ETX Rx Detect: N/A
ETX Rx: N/A

PLC Specific Settings

STX Tx Append: N/A
STX Tx: N/A
ETX Tx Append: N/A
ETX Tx: N/A
Strip Rx STX/ETX Chars: N/A

Application Specific Settings

STX Tx Append: N/A
STX Tx: N/A
ETX Tx Append: N/A
ETX Tx: N/A
Strip Rx STX/ETX Chars: N/A

Modbus/TCP Settings (Raw-Data Only)

Rx (To PLC) Transfer Mode: N/A
Tx (From PLC) Transfer Mode: N/A
Maximum Rx Data Packet Size: N/A
Oversized Rx Packet Handling: N/A
Rx MS Byte First: N/A
Tx MS Byte First: N/A
Disable Non-Filtered To PLC Rx Queue: N/A

Master Rx/Tx Modes

PLC IP Address: N/A

- b. Select **Port 1** to change the serial port settings.

Edit Port 1 Configuration	
Serial Configuration	
Mode:	RS-485
Baud:	9600
Parity:	none
Data Bits:	8
Stop Bits:	1
Flow:	none
DTR:	off
Rx Timeout Between Packets:	200 (ms)
General Protocol Settings	
Serial Port Protocol:	Modbus/RTU
Discard Rx Packets With Errors:	<input type="checkbox"/>
Modbus/RTU Protocol Settings	
Device Response Timeout:	250 (ms)
Serial Packet ID Settings (Raw-Data Only)	
STX (Start of Transmission) Rx Detect:	none Byte 1: Byte 2:
ETX (End of Transmission) Rx Detect:	none Byte 1: Byte 2:
PLC Specific Settings	
STX (Start of Transmission) Tx Append:	none Byte 1: Byte 2:
ETX (End of Transmission) Tx Append:	none Byte 1: Byte 2:
Strip Rx STX/ETX:	<input type="checkbox"/>
Application Specific Settings	
STX (Start of Transmission) Tx Append:	none Byte 1: Byte 2:
ETX (End of Transmission) Tx Append:	none Byte 1: Byte 2:
Strip Rx STX/ETX:	<input type="checkbox"/>
Modbus/TCP Settings (Raw-Data Only)	
Rx (To PLC) Transfer Mode:	Slave (PLC Polls)
Tx (From PLC) Transfer Mode:	Slave (PLC Writes)
Maximum Rx Data Packet Size:	246 (bytes)
Oversized Rx Packet Handling:	Truncate
Rx MS Byte First:	<input type="checkbox"/>
Tx MS Byte First:	<input type="checkbox"/>
Disable Non-Filtered To PLC Rx Queue:	<input type="checkbox"/>
Master Rx/Tx Modes	
PLC IP Address:	0.0.0.0
PLC Device ID:	1 (1-255, 0=broadcast)
Master Rx Mode Only	
PLC Rx Data Address:	1 (Base 1)
Maximum PLC Update Rate:	40 (msec)
Master Tx Mode Only	

- c. On the Mode menu, select **RS-485**.

NOTE: The baud rate you set on the ION Energy Meter Modbus ID ("[Programming the Modbus ID](#)" on page 59) must match the baud rate you set in the Modbus Base Station configuration ("[Configuring the Modbus Base Station](#)" on page 61).

- d. On the Baud menu, select the appropriate baud rate. If multiple meters are connected in a daisy chain series, each meter must use the same baud rate.
6. Configure the Ethernet Device.

- a. From the main page, select **Ethernet Device Configuration**. The Ethernet Device Configuration page appears.

Ethernet Device Configuration (Raw-Data Only)

[Server Configuration Home](#)
[Serial Device Configuration](#)
[Communication Statistics](#)
[PLC Interface Diagnostics](#)

Socket 1

Device TCP Connection Configuration

Enabled:	No
Listen:	No
Listen Port:	8000
Connect To Mode:	Never
Connect Port:	8010
Connect IP Address:	0.0.0.0
Disconnect Mode:	Never
Idle Timeout:	0

Device TCP Connection Status

Remote Connection:	0.0.0.0:0
--------------------	-----------

Modbus/TCP Settings

Rx (To PLC) Transfer Mode:	Slave
Tx (From PLC) Transfer Mode:	Slave
Maximum Rx Data Packet Size:	246
Oversized Rx Packet Handling:	Truncate
Rx MS Byte First:	no
Tx MS Byte First:	no
Disable Non-Filtered To PLC Rx Queue:	no

Master Rx/Tx Modes

PLC IP Address:	N/A
PLC Device ID:	N/A

Master Rx Mode Only

PLC Rx Data Address (Base 1):	N/A
Maximum PLC Update Rate (msec):	N/A

Master Tx Mode Only

PLC Tx Data Address (Base 1):	N/A
PLC Tx Poll Rate (msec):	N/A
PLC Tx Poll Message Length (bytes):	N/A
Tx Sequence Number Syncing Enable:	N/A
PLC Tx Consumed Seq Nbr Address (Base 1):	N/A

Filtering/Data Extraction Configuration

To PLC Filter Mode:	Off
To PLC Filter Options:	
To App Filter Mode:	Off
To App Filter Options:	
RFID Antenna Grouping:	None
RFID Reader Interface Type:	Unspecified
Barcode Format (Standard:Eight Digit):	None:None
Filter Age Time (min:sec.msec):	0:0.100
Discard Unrecognized Data (RFID/Barcode):	Off

Application TCP Connection Configuration

Enabled:	No
----------	----

- b. Select **Socket 1**. The Edit Socket Port 1 Configuration page appears.

Edit Socket Port 1 Configuration

Device TCP Connection Configuration

Enable: ☐

Listen: ☐

Listen Port: 8000

Connect To Mode: Never

Connect Port: 8010

Connect IP Address: 0.0.0.0

Disconnect Mode: Never

Idle Timer: 0 (msec)

Modbus/TCP Settings

Rx (To PLC) Transfer Mode: Slave [PLC Polls]

Tx (From PLC) Transfer Mode: Slave [PLC Writes]

Maximum Rx Data Packet Size: 246 (bytes)

Oversized Rx Packet Handling: Truncate

Rx MS Byte First: ☐

Tx MS Byte First: ☐

Disable Non-Filtered To PLC Rx Queue: ☐

Master Rx/Tx Modes

PLC IP Address: 0.0.0.0

PLC Device ID: 1 (1-255, 0=broadcast)

Master Rx Mode Only

PLC Rx Data Address: 1 (Base 1)

Maximum PLC Update Rate: 40 (msec)

Master Tx Mode Only

PLC Tx Data Address: 1 (Base 1)

PLC Tx Poll Rate: 100 (msec)

PLC Tx Poll Message Length: 0 (bytes)

Tx Sequence Number Syncing Enable: ☐

PLC Tx Consumed Sequence Number Address: 1 (Base 1)

Filtering/Data Extraction Configuration

To PLC Filter Mode: Off

To PLC Filter Options (RFID Only):

☐ Antenna ☐ Filter Value ☐ Serial Number

☐ Company ☐ Product/Location ☐ Encoding/Numbering

To Application Filter Mode: Off

To Application Filter Options (RFID Only):

☐ Antenna ☐ Filter Value ☐ Serial Number

☐ Company ☐ Product/Location ☐ Encoding/Numbering

RFID Antenna Grouping: None

RFID Reader Interface Type: Unspecified

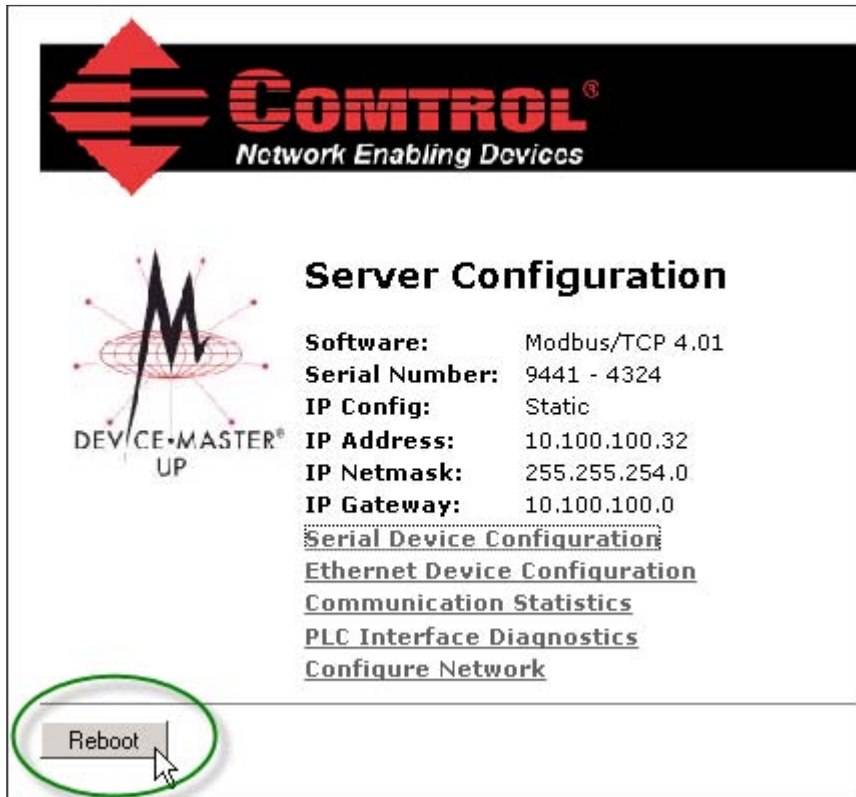
Barcode UPC/EAN Standard 12-14 Digit Format: None

Barcode UPC/EAN Eight Digit Format: None

Filter Age Time (Time filtered after last read): 0 (min) 0 (sec) 100 (msec)

Discard Unrecognized Data (RFID/Barcode): Off

7. From the main page, select **Reboot** to update all new configurations.



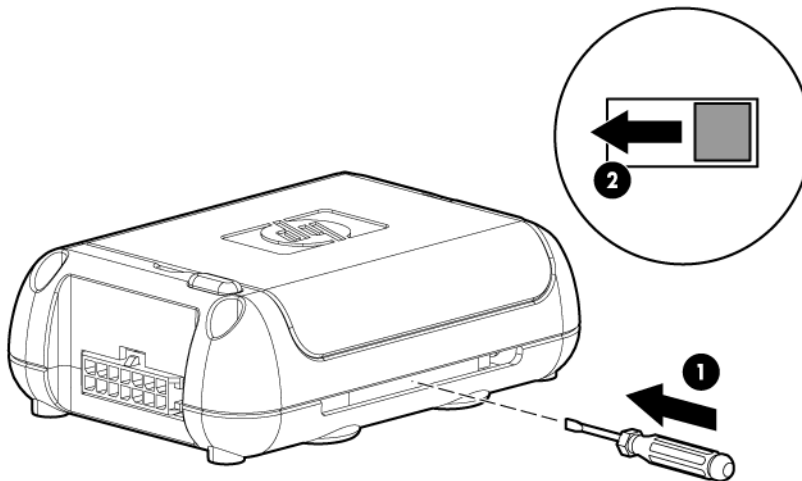
Power up procedure

Powering up the components

1. Verify that the gateway is connected to the power and is working in operation mode by viewing the gateway LED status (on page 18).
 - Connected—The gateway Active LED is either flashing or solid green and the Battery LED is off.
 - Not connected—The gateway Battery LED is either flashing or solid red.

NOTE: The gateway must be active before powering up the base stations.

2. Using a small flathead screwdriver or the power switch toggle, turn on the base stations.



3. Verify that all base stations have connected to the gateway by viewing the base station LED status. This process might take up to 5 minutes.
 - Connected—The base station LED is off.
 - Not connected—The base station LED is flashing red.

Base station LED status

There are three base station modes:

- Off
- Initial power up
- On and operating

The initial power up sequence corresponds to the following steps:

1. During the initial power up mode and after the initial bootup LED sequence, the LED on the base station flashes red while attempting to find and connect to the gateway.
2. When the base station is connected, the LED flashes green indicating that it is communicating with the gateway.
3. When the base station is identified by the gateway, it stops flashing and begins working in operating mode. The LED on the base station is off.

The initial power up mode only lasts approximately 5 to 10 minutes.

- If the LED is still flashing red after 10 minutes:
 - Verify that the gateway is powered up and connected to the network.
 - Verify that all the HP Insight Environmental Observer software components are installed and running properly.
- If the LED is still flashing green after 10 minutes, verify that the deployment lab configuration was properly exported.
- If the LED is flashing yellow, the base station is not in the correct operating mode. Toggle the power button three times, (On, Off, On, Off, On) with a maximum of 1 to 2 seconds between each toggle.

Troubleshooting

HP Insight Environmental troubleshooting tips

To troubleshoot communication issues:

1. Turn off all of the wireless base stations in the data center.
2. Power cycle each of the wireless gateways ("[Power cycle the wireless gateways](#)" on page 72).
3. From the server, turn off the HP Insight Environmental Device Manager component.
4. Verify that each of the gateways are communicating ("[Verifying gateway communication](#)" on page 72).
5. From the server, restart the HP Insight Environmental Device Manager component.
6. Turn on each of the wireless base stations, and verify that they join the wireless network within ten minutes.
7. From the server, use the HP Insight Environmental Observer software to verify that the wireless base stations are reporting sensor data.
8. Turn on all remaining wireless base stations.

Power cycle the wireless gateways

1. Turn the gateway off then back on again.
2. Verify that green (ACT) LED and the Ethernet port LEDs are blinking.
3. If the LEDs are not blinking when the gateway is turned on, power cycle twice, turning the gateway off, on, off, on, with a one second pause in between each cycle.

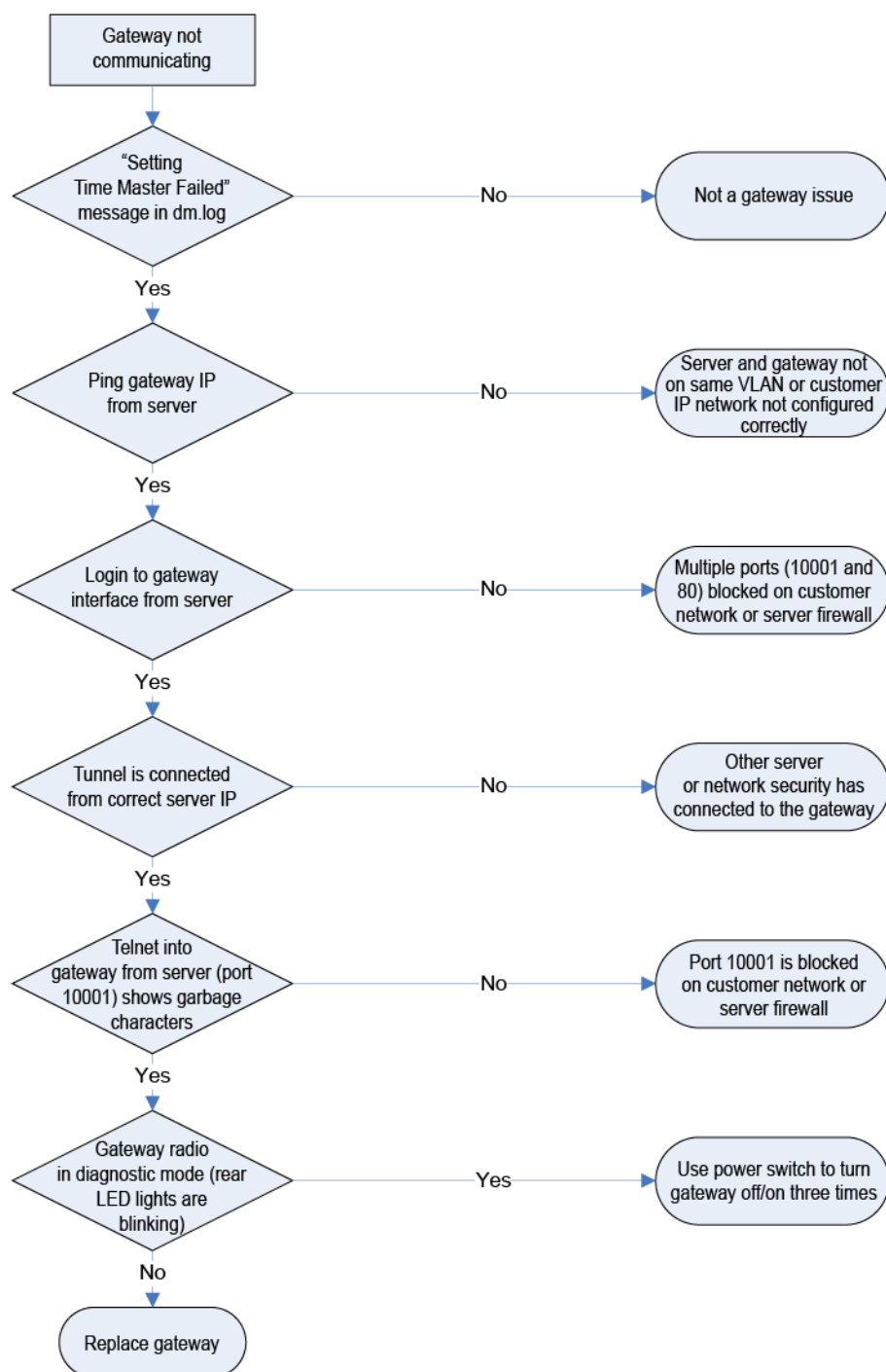
Verifying gateway communication

1. From the server, enter the following Windows® command prompt:

```
telnet <IP address of the HP base station gateway> 10001
```

 - If special characters are scrolling across the screen, the gateway is properly configured and communicating with the server.
 - If special characters are not scrolling across the screen, verify that port 10001 is not blocked on the network port or for the gateway static IP address.
2. Repeat step 1 for all wireless gateways.

Use the following flow chart to help troubleshoot gateway communication errors and determine whether you must replace the gateway.



Verifying network settings

You must set network and Ethernet settings in three separate locations. Both the Ethernet Speed and Ethernet Duplex must be set to Auto and must match in each of the three locations:

- Network Configuration of the HP Base Station Gateway

- Network card on the Edge server
- Network switch between the Edge server and the gateway

Verifying HP Water Leak Detection Base Station functionality

When verifying the functionality of the water leak detector base station, the LED status must match the status reported in the Observer software.

LED status	Observer status	Meaning
Solid light	Status icon is green (normal status)	No alarms present
Flashing (on 1/2 second, off 1/2 second)	Status icon is ____ (water leak condition is active)	Leak alarm
Flashing (on 1/2 second, off 2 and 1/2 seconds)	Status icon is red (alarm status)	Cable break alarm

Verifying ION power meter communication

Communication from the ION power meter to the Observer software includes:

- Serial Modbus communication from the power meter to the Modbus base station device
- Ethernet Modbus/TCP communication from the Modbus base station device to the Observer software

To make sure that the ION power meters communicate correctly with the server and Observer software, verify the following connections.

- Verify the ION power meters (in a daisy chain configuration) are connected to the Modbus base station via an RS-485 serial connection.
 - If multiple ION power meters are connected to the Modbus base station (in a daisy chain), verify that each power meter has a unique device ID ("[Programming the Modbus ID](#)" on page 59) and that the last meter in the configuration has the terminating resistor connected ("[Programming Modbus communication](#)" on page 59).
 - If multiple ION power meters are connected to the Modbus base station (in a daisy chain) and some of the power meters are not communicating, verify that the RS-485 connections down the daisy chain are securely connected.
 - Verify that all cable connection points are installed and securely fastened to the terminal block.
- Verify the Modbus base station is connected to the server network connection via Ethernet cable.
 - Verify the Modbus base station is powered on.
 - From the server, ping the Modbus base station to verify it is connected to the network.
 - Verify the Modbus base station has the duplex setting set to Auto Duplex ("[Verifying network settings](#)" on page 73).
- Verify that the Modbus plug in component was installed during the Device Manager installation. If the Modbus plug in component was not installed, the Observer software cannot communicate to the ION power meters, and no Modbus communication occurs to the Edge server.

Verifying the CT shorting block position

If the CT values for your ION power meter all appear to be zero, a CT shorting block might be in the down (installation) position. Verify that all of the shorting blocks are in the up (operating) position.

Regulatory compliance notices

Wireless devices

You can install one or more integrated wireless devices. In some environments, the use of wireless devices might be restricted. Such restrictions might apply on airplanes, in hospitals, near explosives, or in other hazardous locations. Before you turn on this product, be sure that you understand local policies and have proper authorization.

Do not co-locate or operate this device in conjunction with any other antenna or transmitter.

To avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antennae should be greater than 20 cm (8 in).



WARNING: Exposure to Radio Frequency Radiation—The radiated output power of this device is below the FCC radio frequency exposure limits. Nevertheless, human contact during normal operation should be minimized.

Federal Communications Commission notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Hewlett-Packard Company may void the user's authority to operate the equipment.

FCC Operation Notice

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Canadian notices

Wireless operation is subject to two conditions. The first is that the wireless device may not cause interference. The second is that the wireless device must accept any interference, including interference that may cause undesired operation of the device.

European Union regulatory notice

Products bearing the CE marking comply with the following EU Directives:

- Low Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC
- Ecodesign Directive 2009/125/EC, where applicable

CE compliance of this product is valid if powered with the correct CE-marked AC adapter provided by HP.

If this product has wired and/or wireless telecommunications functionality, it also complies with the essential requirements of the following EU Directive:

- R&TTE Directive 1999/5/EC

Compliance with these directives implies conformity to the applicable harmonized European standards (European Norms) that are listed in the EU Declaration of Conformity issued by HP for this product or product family and available (in English only) either within the product documentation or at the following HP website (<http://www.hp.eu/certificates>) (type the product number in the search field).

The compliance is indicated by one of the following conformity markings placed on the product:

For non-telecommunications products and for EU harmonized telecommunications products, such as Bluetooth® within power class below 10mW.



For EU non-harmonized telecommunications products (If applicable, a 4-digit notified body number is inserted between CE and !).



Please refer to the regulatory label provided on the product.

The telecommunications functionality of this product may be used in the following EU and EFTA countries: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, and United Kingdom.

The telephone connector (not available for all products) is intended for connection to analogue telephone networks.

Products with wireless LAN devices:

Some countries may have specific obligations or special requirements about the operation of Wireless LAN networks such as indoor use only or restrictions of the channels available. Please make sure that the country settings of the wireless network are correct.

France:

For 2.4 GHz Wireless LAN operation of this product, certain restrictions apply: This product may be used indoors for the entire 2400-MHz to 2483.5-MHz frequency band (channels 1 to 13). For outdoor use, only the 2400-MHz to 2454-MHz frequency band (channels 1 to 7) may be used. For the latest requirements, see the ARCEP website (<http://www.arcep.fr>) <http://www.arcep.fr>.

The point of contact for regulatory matters is Hewlett-Packard GmbH, Dept./MS: HQ-TRE, Herrenberger Strasse 140, 71034 Boeblingen, GERMANY.

Brazilian notices

Este equipamento opera em caráter secundário, isto é, não tem direito a proteção contra interferência prejudicial, mesmo de estações do mesmo tipo, e não pode causar interferência a sistemas operando em caráter primário.

Japanese notices

この機器の使用周波数帯では、電子レンジ等の産業・科学・医療用機器のほか工場の製造ライン等で使用されている移動体識別用の構内無線局（免許を要する無線局）及び特定小電力無線局（免許を要しない無線局）が運用されています。

- 1 この機器を使用する前に、近くで移動体識別用の構内無線局及び特定小電力無線局が運用されていないことを確認して下さい。
- 2 万一、この機器から移動体識別用の構内無線局に対して電波干渉の事例が発生した場合には、速やかに使用周波数を変更するか又は電波の発射を停止した上、下記連絡先にご連絡頂き、混信回避のための処置等（例えば、パーティションの設置など）についてご相談して下さい。
- 3 その他、この機器から移動体識別用の特定小電力無線局に対して電波干渉の事例が発生した場合など何かお困りのことが起きたときは、次の連絡先へお問い合わせ下さい。

連絡先：日本ヒューレット・パッカード株式会社 TEL：0120-014121

Taiwan notices

低功率電波輻射性電機管理辦法

第十二條 經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

第十四條 低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。

前項合法通信，指依電信規定作業之無線電信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。



Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. To forward them to recycling or proper disposal, use the public collection system or return them to HP, an authorized HP Partner, or their agents.

For more information about battery replacement or proper disposal, contact an authorized reseller or an authorized service provider.

Taiwan battery recycling notice

The Taiwan EPA requires dry battery manufacturing or importing firms in accordance with Article 15 of the Waste Disposal Act to indicate the recovery marks on the batteries used in sales, giveaway or promotion. Contact a qualified Taiwanese recycler for proper battery disposal.



Acronyms and abbreviations

CRAC

computer room air conditioning

CRAH

computer room air handler

CT

current transducer

LED

light-emitting diode

PDU

power distribution unit

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